SE125-AL-MMM-010
NAVSEA NAVSEA 0910-LP-066-0090

TECHNICAL MANUAL

INSTALLATION, OPERATION, MAINTENANCE AND REPAIR INSTRUCTIONS WITH PARTS LIST

ORGANIZATIONAL, INTERMEDIATE, AND DEPOT MAINTENANCE

RADIO RECEIVING SET AN/URR-74(V)2
PART NO.: WJ-8718//MIN

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

When it is necessary to work on equipment with the primary power (115 Vac or 220 Vac) energized, use extreme caution to avoid contact with this dangerous voltage.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid in case of electrical shock.

RESUSCITATION

Personnel working in high voltage areas should be familiar with modern methods of resuscitation as prescribed by the Bureau of Medicine and Surgery.

The following warnings and cautions are a summation of more detailed warnings and cautions appearing throughout the manual, and are shown here for emphasis. It is recommended that they be thoroughly read before performing any maintenance.

WARNING

This equipment employs dangerous voltages which can be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed. (pages 4-1, 4-3, 5-1, 5-4, 5-19, 5-21, 5-22, 5-24, 5-27, 5-29, 5-33, 5-34, 5-38, 5-39, 5-44, 5-48, 5-52, 5-54, 5-55, 5-56, 5-60, 5-62, 6-1, 6-2, 6-5, 6-6, 6-8, 6-9, 6-10, 6-12, 6-13, 6-14, 6-16, 6-17, 6-18 and 8-2.)

WARNING

To prevent electrical shock or damage, aways disconnect the receiver from the power source before removing modules or when soldering or replacing components (page 6-22).

WARNING

To prevent electrical shock, or damage to the receiver, place the POWER PUSH ON/OFF pushbutton in the off (out-red background not displayed) position and disconnect the power cord from A13J1 during line voltage selection (page 8-2).

CAUTION

Excessive lubrication of the encoder shaft may destroy the optical characteristics of the encoder wheel (page 4-2).

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, zylene, acetone or similar solvents. These chemicals may damage plastics used in the receiver (page 4-2).

CAUTION

Line audio output levels in excess of 24.5 Vac (with attenuator A11 off) may cause damage to the receiver and/or the 600-ohm load resistor. With A11 on, levels must not exceed 0.774 Vac (pages 4-9 and 4-10).

CAUTION

Exercise caution so that input converter does not short to adjacent power supply circuitry (page 6-4).

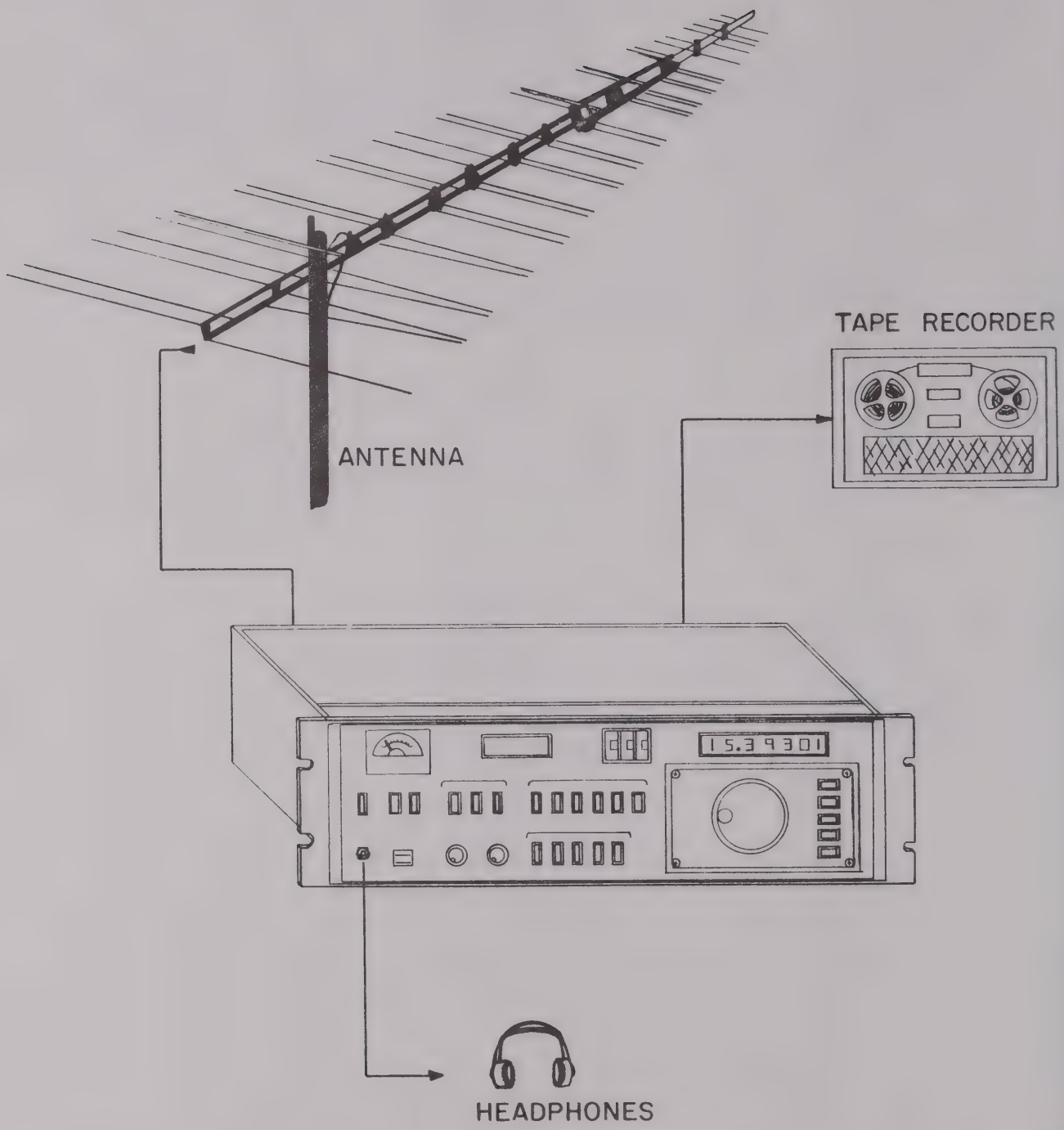


Figure 1-1. Radio Receiving Set AN/URR-74(V)2

CHAPTER 1

GENERAL INFORMATION AND SAFETY PRECAUTIONS

1-1. INTRODUCTION. This technical manual provides description, operation, troubleshooting, repair and parts list information and instructions for Radio Receiving Set AN/URR-74(V)2 (hereinafter called the receiver). The information herein is applicable to serial numbers A1 through A4. The receiver is used with an appropriate antenna system, and audio monitoring equipment such as headphones, speakers, or tape recorders (see figure 1-1). Operation and maintenance instructions for the antenna and the audio monitoring equipment are contained in the technical manuals for the particular equipment installed.

1-2. SAFETY PRECAUTIONS. All safety precautions necessary for the protection of personnel and equipment are stated in warnings and cautions in the text of this manual. The safety summary that precedes chapter 1 contains the general safety precautions and lists all warnings and cautions that appear in the manual.

1-3. EQUIPMENT DESCRIPTION. The receiver (figure 1-1) detects amplitude modulation (am.), frequency modulation (fm), continuous wave (cw), and single sideband (ssb) signals in a frequency range of 5 kHz to 29.99999 MHz. The receiver has selectable intermediate frequency (if.) bandwidths, gain modes, beat frequency oscillator (bfo) offset, audio attenuation, and a seven-digit LED frequency display.

a. Reception. In addition to am., fm, and cw detection, the receiver can also detect three single-sideband signals; upper sideband (usb), lower sideband (lsb) and independent sideband (isb). These modes are selected by a multi-section DETECTION MODE switch. This switch has six pushbuttons marked AM, FM, CW, USB, LSB, and ISB. When the AM, FM, or CW pushbutton is used, one-of-five available if. bandwidths must also be selected. The multi-section IF BANDWIDTH kHz switch has five pushbuttons for selecting .3, 1.0, 3.2, 6, or 16 kHz bandwidths. The GAIN MODE switch allows selection of two automatic gain control (agc) modes. The AGC-FAST pushbutton is used for am. and fm detection modes. The AGC-SLOW is used for cw and the ssb modes. The GAIN MODE-MANUAL pushbutton enables the RF GAIN control. The KILOHERTZ-BFO OFFSET switch is activated only in the cw detection mode and provides ±8.9 kHz of offset in 100 Hz steps selectable by switches on the front panel.

b. Audio Output. The audio output for the detected mode is supplied as the line audio at the rear panel output audio connector and through the phones jack at the front panel. In the isb detection mode, the usb audio is supplied at the rear panel line audio output while the lsb audio is supplied through a separate isb audio output at the rear panel output audio connection. Also, in the isb detection mode, the usb audio is supplied at the front panel phones tip while the lsb audio is supplied at the ring. The phones output level is adjustable by the PHONE LEVEL control on the front panel, while the line audio output level is adjustable by the LINE AUDIO LEVEL potentiometer on the rear panel. A separate switchable audio attenuator is used for each of the line audio and isb audio outputs. The two audio attenuators, when out, have no effect on the audio output. When selected in, attenuator number one provides 30 dB of attenuation for the line audio output and attenuator number two provides 20 dB of attenuation for the isb audio output.

c. Tuning. The receiver is tuned manually, using the tuning knob in conjunction with the tuning rate pushbuttons. One of these pushbuttons provides a method of locking the frequency to prevent accidental changes. A non-volatile memory stores the tuned frequency for a minimum of 48 hours after any power interruption. A dual-purpose signal strength meter indicates either signal strength or line audio level, as selected. An

elapsed time meter shows receiver running time from 0 to 9999 hours.

d. Internal Tuning Circuitry. Internal frequency tuning circuitry of the receiver includes the 1st, 2nd and 3rd lo and the bfo synthesizers. The phase lock loop frequency synthesizers determine tuned frequency to a resolution of 10 Hz.

e. Receiver Connections. Rear panel features include a type-N rf input connector, a bnc 455 kHz if. output connector, a 13-pin audio output connector for phones, line, isb, fm/cw/ssb audio, a 1 MHz reference input/output, selectable by a related slide switch, and a type MS3102-16S-5P power input connector adaptable to either 115 or 230 Vac operation.

f. Component Accessibility. The receiver is designed to ensure easy accessibility of all its components for inspection, testing, and maintenance. Removal of chassis top cover exposes assemblies and components which are mounted on circuit boards. All assemblies may be unplugged from their mounting sockets and freed from the chassis by quick disconnect plugs. Circuit boards plug into motherboards. Motherboard pins are accessible after removing the chassis bottom panel. Dc power supplies have thermal and overvoltage protection, need no adjustment, and are easily accessible.

g. Receiver Mounting. The receiver mounts in a standard 19-inch equipment rack, occupies 5.25 inches of vertical space, and extends 19.62 inches into the rack. The main chassis, front, rear, top, bottom, and internal compartment panels are constructed of aluminum. The top and bottom covers provide electro-magnetic interference (emi) shielding. All operator controls and indicators are located on the front panel. All input and output cables, with the exception of the front panel mounted phone jack, are connected to jacks on the rear panel. Switchable audio attenuators A11 and A12, and voltage select switches S2 and S3, are accessible only after removal of the top cover.

h. Panel Fabrication. The receiver side panels are nickel-plated, cast aluminum, the front panel 0.19-inch aluminum plate, and the rear panel, main deck, and internal partitions are stamped aluminum. The side panels and top and bottom covers are perforated to allow for flow-through ventilation.

1-4. REFERENCE DATA. All applicable reference data is listed in table 1-1.

1-5. EQUIPMENT ACCESSORIES, AND DOCUMENTS SUPPLIED. No accessories are supplied with the receiver. Equipment and documents supplied are listed in table 1-2.

1-6. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED. This data is listed in table 1-3.

1-7. FIELD AND FACTORY CHANGES. No field or factory changes are in effect at the time of this printing. Tables 1-4 and 1-5 provide space for recording future field and factory changes. Make appropriate entries in these tables when field or factory changes are incorporated into the equipment.

Table 1-1. Reference Data

Characteristics	Specification
Tuning Range	5 kHz to 29.99999 MHz.
Tuning Resolution	10 Hz.
Antenna Conducted Oscillator Radiation	-87 dBm, maximum.
Antenna Input Protection	The antenna input will withstand the effects of rf power to +15 dBm and static build-up.
Input Impedance	50-ohm, unbalanced, nominal.
If. Bandwidths (3 dB)	Standard: .3, 1, 3.2, 6, and 16 kHz.
If. Shape Factor	If. BW — 60 dB: 3 dB, Typical .3 kHz — 7.0:1 1 kHz — 4.5:1 3.2 kHz — 2.5:1 6 kHz — 2.3:1 16 kHz — 2.0:1
Detection Modes	Am., fm, cw. Lsb, usb, isb.
Gain Control Modes	Manual, fast age, slow age.
Age and Manual Range	100 dB, minimum.
Age Threshold	3.0 microvolts, typical.
Age Attack Time	15 ms, maximum.
Age Release Time	Fast age: 25 ms, maximum. Slow age: 4 sec, maximum.
Frequency Display	7 digit, LED.
Frequency Resolution/Readout	10 Hz.
Frequency Stability	6×10^{-8} per day, 2×10^{-6} per year.
Frequency Control	Manual
Synthesizer Lock-Up Time	3 ms, typical; 10 ms, maximum.
Synthesized Bfo	455 kHz ±8.9 kHz in 100 Hz steps.

Table 1-1. Reference Data-Continued

Characteristics	Specification
Power Interrupt	With the manual control module option, storage of the frequency data will automatically occur. Upon restoration of power, the receiver will return to the previously tuned frequency.
If. Rejection	Greater than 90 dB.
Image Rejection	Greater than 90 dB.
Sensitivity (0.2-30 MHz, see cw sensitivity for extended frequency range)	
Am. Sensitivity (6 kHz if. Bandwidth)	A 1.7 microvolts signal 50% am. modulated at a 400 Hz rate will produce at least a 10 dB (S+N)/N ratio at the audio output.
Fm Sensitivity (16 kHz if. Bandwidth)	A 2.5 microvolts signal fm modulated at a 400 Hz rate to a 4.8 kHz peak deviation will produce at least a 17 dB (S+N)/N ratio at the audio output.
Cw Sensitivity (.3 kHz if. Bandwidth)	
200 kHz-30 MHz	A 0.4 microvolts signal will produce a 16 dB (S+N)/N ratio at the audio output.
50 kHz-200 kHz	A 0.63 microvolts signal will produce a 16 dB (S+N)/N ratio at the audio output.
15 kHz-50 kHz	A 1.4 microvolts signal will produce a 16 dB (S+N)/N ratio at the audio output.
5 kHz-15 kHz	A 63 microvolts signal will produce a 16 dB (S+N)/N ratio, typically at the audio output.
Isb, (usb, lsb) Sensitivity (3 kHz ssb bandwidth)	A 0.56 microvolts signal will produce a 10 dB (S+N)/N ratio at the audio output.
Audio Outputs:	
Isb Output (attenuator out)	100 mW, maximum across 600 ohms.
(attenuator in 20 dB)	600 ohms

Table 1-1. Reference Data-Continued

Characteristics	Specification
Line Audio (attenuator out)	1 W, minimum, across 600 ohms for an input signal of 3 microvolts, 30% am. modulated at a 400 Hz rate.
(attenuator in 30 dB)	16 ohms
Headphone Output	30 mW, minimum, for an input signal of 3 microvolts, 30% am. modulated at a 400 Hz rate.
Audio Distortion	Less than 5% at rated audio output.
Audio Frequency Response	±1.5 dB from 100 Hz to 8 kHz, 1 kHz reference frequency.
Final If. Output	20 millivolts, minimum, into 50 ohms for input signals greater than 3.0 microvolts.
Intermodulation Distortion: 3rd Order Input Intercept Point	+20 dBm, minimum for signals separated by 30 kHz, (performance may degrade below 3 MHz).
Unwanted Sideband Rejection	50 dB at 350 Hz into unwanted sideband.
Signal Meter	Indicates carrier level or line audio level.
Reciprocal Mixing	With a desired signal of 25 microvolts in the 3.2 kHz if. bandwidth, the desired signal-to-noise ratio will be greater than 20 dB, when an undesired signal 70 dB higher in amplitude and 30 kHz removed in frequency is present.
Cross Modulation	With a desired signal of 10 microvolts an undesired signal 70 dB higher, 30% am. modulated will produce less than 10% cross modulation for frequency separation of greater than 50 kHz in the 1 kHz if. bandwidth.

Table 1-1. Reference Data-Continued

Characteristics	Specification
Operating Temperature Range	0°C to 50°C.
Maximum Humidity	95% (with no condensation)
Power Consumption	0.6 A at 115 Vac, approximately.
Power Requirements	115 or 230 Vac ±15% 48-420 Hz single phase.

Table 1-2. Equipment and Documents Supplied

Quantity	Nomenclature	Unit no.	Dimensions			Weight (lb) */**	Volume (cu ft) */**
			Height (in.) */**	Width (in.) */**	Depth (in.) */**		
1	Radio Receiving Set AN/URR-74(V)2	1	5.25/10	19/24	19.4/26	35/49	1.12/3.61
1	Connector, receptacle, electrical	1	--	--	--	--	--
1	Connector, plug, electrical	1	--	--	--	--	--
1	Technical Manual SE125-AL-MMM-010/AN/URR-74 (V)2	1	--	--	--	--	--

*Uncrated
**Crated

Table 1-3. Equipment and Publications Required But Not Supplied

Category	Recommended equipment/ publications	Alternate	Equipment test parameters	Application*
Signal Generator	CAQI-8640B	SCAT 4372	Am., fm, cw, rf output -111 dBm to 0 dBm	SM, CM, TS
Oscilloscope	AN/USM-281	SCAT 4308	Dc to 50 MHz	SM, CM, TS
Rf Voltmeter	CCVO-91H-S7	SCAT 4200	1 millivolt to 3.0 V -50 dBm to +20 dBm	SM, CM, TS
Variable Transformer	CN-16B/U	SCAT 4653	Metered output from 90-115 Vac	
Variable Transformer	General Radio W5HMT or equivalent	SCAT 4995	Output variable from 180-220 Vac	
Ac Voltmeter	CAQI-400GL-CO1	SCAT 4195	1 millivolt to 300 V full scale	SM, TS
Frequency Counter	AN/USM-207	SCAT 4296	0 to 500 MHz	SM, CM, TS
Digital Voltmeter	CCUH-8120A	SCAT 4212	Dc ranges, 1% or better	CM, TS
Sweep Generator	SG-1020/UR	SCAT 4378	100 kHz to 11.0 MHz	CM
Indicator, VSWR	AN/USM-37	SCAT 4470	3 to 12.4 GHz	SM, CM, TS
Specturm Analyzer	AN/USM-394	SCAT 4338	10 MHz to 40 GHz	SM, CM, TS
Tracking Generator	N/A	N/A	N/A	SM, CM, TS
Headphones	Any mono or stereo headphone of 600-ohm impedance			SM, TS
Summer	Mini-circuits ZSC-2-1 or equivalent			2:1, 50 ohms
Terminator	Any 600-ohm, ±10%, 4 W load			SM, CM, TS
Terminator	Any 600-ohm, ±10%, 1/2 W load			SM, CM, TS

*Applications are coded as follows: scheduled maintenance (SM), corrective maintenance (CM) and troubleshooting (TS).

Table 1-3. Equipment and Publications Required But Not Supplied-Continued

Category	Recommended equipment/ publications	Alternate	Equipment test parameters	Application*
Operation and Maintenance Instructions for Signal Generator	NAVSEA 0969-285-3010 NAVSEA 0969-285-3020			
Operation and Maintenance Instructions for Oscilloscope	NAVSEA 0969-244-3010 NAVSEA 0969-244-3020			
Operation and Maintenance Instructions for RF Voltmeter	NAVSEA 0969-159-4010			
Technical Manual for Variable Transformer	TM11-5950-205-15P			
Operation and Maintenance Instructions for Variable Transformer	NAVSEA 0969-173-0010			
Operation and Maintenance Instructions for AC Voltmeter	NAVSEA 0969-173-0010			

*Applications are coded as follows: scheduled maintenance (SM), corrective maintenance (CM) and troubleshooting (TS).

Table 1-3. Equipment and Publications Required But Not Supplied-Continued

Category	Recommended equipment/ publications	Alternate	Equipment test parameters	Application*
Operation and Maintenance Instructions for Frequency Counter	NAVSEA 0969-165-0010 NAVSEA 0969-028-4010 NAVSEA 0969-028-4020 NAVSEA 0969-028-4030			
Operation and Maintenance Instructions for Digital Voltmeter	NAVSEA 0965-165-0010 NAVSEA 0965-271-6010			
Operation and Maintenance Instructions for Sweep Generator	NAVSEA 0969-160-5010 NAVSEA 0969-160-5020			
Operation and Maintenance Instructions for Indicator, VSWR	NAVSEA 0967-092-5010			
Operation and Maintenance Instructions for Spectrum Analyzer	NAVSEA 0967-466-7010			
Operation and Maintenance Instructions for Tracking Generator	HP 8443A			

*Applications are coded as follows: scheduled maintenance (SM), corrective maintenance (CM) and troubleshooting (TS).

Table 1-4. Field Changes

Change Number	Nomenclature	Descriptions

Table 1-5. Factory Changes

Change Number	Nomenclature	Descriptions

CHAPTER 2

OPERATION

2-1. INTRODUCTION. This chapter contains operating instructions for Radio Receiving Set AN/URR-74(V)2 (receiver). Included are the description and function of the controls and indicators, procedures for equipment turn-on and turn-off, and operator maintenance. The receiver is used (in conjunction with a suitable antenna and audio monitoring equipment) by the operator to receive, detect and amplify am., fm, cw, and ssb radio signals in the frequency range of 5 kHz to 29.99999 MHz. The operator selects and monitors the desired frequency bandwidths and modes, using the controls and indicators mounted on the receiver. These controls and indicators are illustrated in figures 2-1 and 2-2.

2-2. CONTROLS AND INDICATORS. Information on receiver controls, indicators, protective devices, and panel-mounted connectors is included in this chapter. This information is shown in table 2-1. The first column references figure and index numbers as an aid in locating the component. The second column contains component nomenclature, including placard designation, and pertinent mechanical and electrical characteristics. The third column describes functions of the listed components in each control position. Also, indications are described and electrical connections are listed.

2-3. OPERATING PROCEDURES. The following paragraphs provide procedures for receiver turn-on and check-out, equipment operation, and equipment turn-off.

a. Operator Turn-on. Before operating the receiver, perform the turn-on and check-out procedures of table 2-2. If the required indications cannot be obtained, stop the turn-on procedure until appropriate troubleshooting and repair actions have been taken.

b. Modes of Operation. The receiver can be set to operate in the am., fm, cw, usb, lsb, or isb signal detection modes. Operating procedures depend on the type of signal to be received. Complete operating procedures for each detection mode are given in tables 2-3 through 2-8.

c. Operation under Interfering Conditions. Operation under interfering conditions is the same as operation under normal conditions.

d. Operator Turn-off. To turn off the receiver, depress the POWER PUSH ON/OFF switch.

e. Battle-short or Emergency Operation. There are no special procedures for emergency operation of the receiver. Should the receiver fail to function, verify security of line cord and condition of fuses F1 and F2 (4 and 5, figure 2-2).

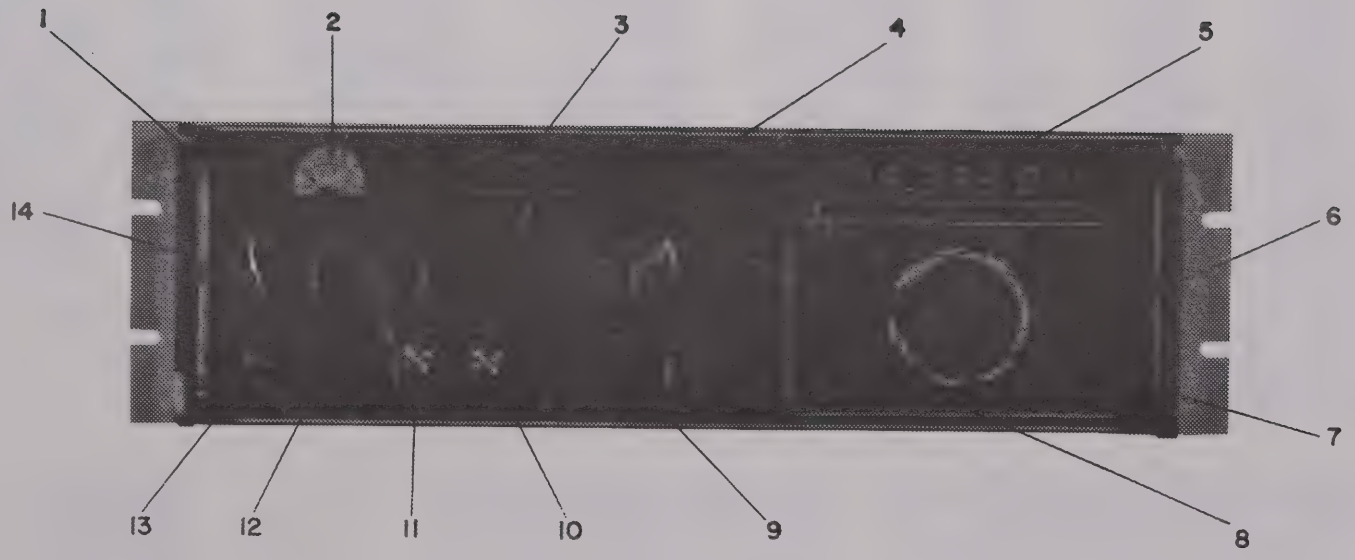
f. Emergency Turn-off Procedure. In the event of an emergency requiring the shut down of the receiver, depress POWER PUSH ON/OFF pushbutton switch. If further problems are encountered, alert cognizant maintenance authority.

2-4. OPERATOR MAINTENANCE ACTIONS AND SCHEDULE. The operator maintenance schedule is provided in table 2-9. The last column in this table contains references to the following procedural steps and also to the operational mode procedures in tables 2-3 through 2-8.

a. Visual Inspection. Visual inspection is to be conducted each day the receiver is used. Operator is to accomplish the following steps:

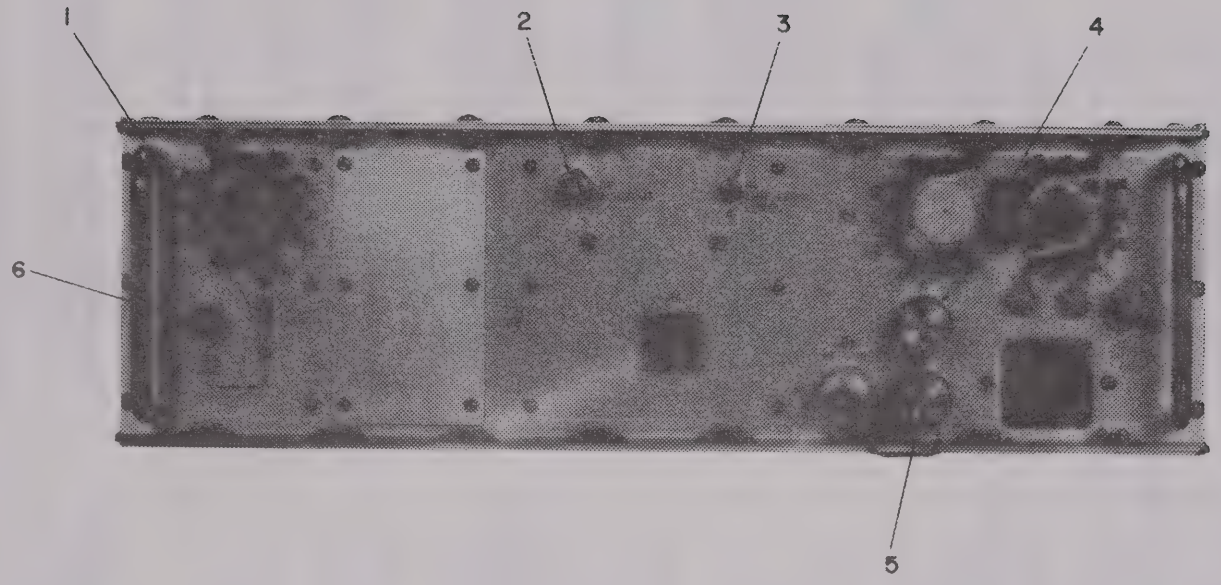
(1) Inspect for loose or damaged knobs, switches, covers, panels, and external connections. Tighten or replace as necessary.

(2) Inspect cabinet, panels, and covers for nicks, scratches, or worn spots



1. METER switch
2. signal strength meter
3. GAIN MODE switch
4. KILOHERTZ-BFO OFFSET switch
5. MEGAHERTZ readout
6. tuning resolution switch
7. tuning knob
8. DETECTION MODE switch
9. IF BANDWIDTH kHz switch
10. PHONE LEVEL potentiometer
11. RF GAIN potentiometer
12. HOURS meter
13. PHONES jack
14. POWER PUSH ON/OFF switch

Figure 2-1. Receiver, Front Panel Controls and Indicators



1. S2 CLOCK-INT-EXT switch
2. J12-IF OUTPUT connector
3. R1-LINE AUDIO LEVEL potentiometer
4. F1 fuse
5. F2 fuse
6. J11-1 MHz-REF connector

Figure 2-2. Receiver, Rear Panel Controls and Indicators

on-surface. Sand and refinish defective areas as necessary.

(3) Inspect all external areas of receiver for accumulations of dust, dirt, or oil. Clean as described in paragraph 2-4b.

(4) Inspect all cable connections for tightness. Tighten as required.

b. External Cleaning. Use a soft lint-free cloth and a soft brush to remove dust and dirt from the receiver. Remove deposits of dirt, grease, and oil from the equipment with a soft cloth moistened in a mild soap and water solution.

Table 2-1. Controls and Indicators

Figure 2-1 index no.	Nomenclature	Function
1	METER switch, two-station dpst pushbuttons with yellow indicators.	Selects line audio output for display on signal strength meter and displays yellow indicator when LINE AUDIO pushbutton is depressed. Selects signal strength for display on signal strength meter and displays yellow indicator when SIGNAL STRENGTH pushbutton is depressed.
2	signal strength meter.	Indicates line audio level or signal strength depending on selection of meter switch.
3	GAIN MODE switch, three-station dpst pushbuttons with yellow indicators.	Selects 15 ms response time for am. and fm signals and displays yellow indicator when AGC-FAST pushbutton is depressed. Selects 15 ms attack time and 2 second decay time for cw, isb, and ssb signals and displays yellow indicator when AGC-SLOW pushbutton is depressed. Enables RF GAIN control and displays yellow indicator when MAN pushbutton is depressed.
4	KILOHERTZ-BFO OFFSET three-section thumb-wheel switch.	Selects bfo offset in kHz when enabled by DETECTION MODE-CW switch. Selects 455 kHz when the first wheel is set at "0", regardless of the setting of the other two wheels.

Table 2-1. Controls and Indicators-Continued

Figure 2-1 index no.	Nomenclature	Function
5	MEGAHERTZ seven-digit, yellow LED, readout.	Displays tuned frequency in MHz. The LED intensity is not operator adjustable.
6	tuning resolution switch, five-station dpst push-buttons with green indicators.	Locks receiver to frequency displayed, releases other tuning buttons, disables tuning knob and displays green indicator when DSBL/RMT pushbutton is depressed.
	tuning resolution switch.	Locks last three digits of frequency display, allowing the first four digits to be varied, and also displays green indicator when 10 kHz pushbutton is depressed.
		Locks last two digits of frequency display, allowing the first five digits to be varied, and also displays green indicator when 1 kHz pushbutton is depressed.
		Locks last digit of frequency display, allowing all other digits to be varied, and also displays green indicator when 100 Hz pushbutton is depressed.
		Allows all digits of frequency display to be varied and displays green indicator when 10 Hz pushbutton is depressed.
7	tuning knob.	Increases tuned frequency when rotated clockwise with DSBL/RMT pushbutton disengaged.
		Decreases tuned frequency when rotated counterclockwise with DSBL/RMT push-button disengaged.
		NOTE Should the limits of a selected tuning band be exceeded during tuning, the receiver steps to the opposite end of the band allowing tuning to continue.

Table 2-1. Controls and Indicators-Continued

Figure 2-1 index no.	Nomenclature	Function
8	DETECTION MODE six-station, dpst pushbuttons with yellow indicators.	Selects one-of-six detection modes. Bandwidths must be selected for am., fm, and cw modes, however a sideband mode selection automatically selects its related bandwidth filter.
	DETECTION MODE.	Selects am. mode and displays yellow indicator when AM pushbutton is depressed.
		Selects fm mode and displays yellow indicator when FM pushbutton is depressed.
		Selects cw mode and displays yellow indicator when CW pushbutton is depressed.
		Selects isb mode with related bandwidth filter and displays yellow indicator when ISB pushbutton is depressed.
		Selects lsb mode with related bandwidth filter and displays yellow indicator when LSB pushbutton is depressed.
		Selects usb mode with related bandwidth filter and displays yellow indicator when USB pushbutton is depressed.
9	IF BANDWIDTH kHz five-station dpst pushbuttons with yellow indicators.	Selects one-of-five different if. bandwidths (.3, 1.0, 3.2, 6, or 16 kHz) by depressing pushbutton beneath the desired placard.
10	PHONE LEVEL potentiometer.	Adjusts phone audio level at front panel phone jack and also at the phone audio connection at rear panel jack J14.
11	RF GAIN potentiometer.	Adjusts receiver gain when GAIN MODE-MAN pushbutton switch is depressed.
12	HOURS elapsed time four-digit meter.	Indicates receiver running time from 0 to 9999 hours.

Table 2-1. Controls and Indicators-Continued

Figure 2-1 index no.	Nomenclature	Function
13	PHONES open circuit three conductor telephone jack.	Provides access for 600-ohm stereo headphones.
14	POWER PUSH ON/OFF switch.	Turns power on and displays red indicator when depressed.
Figure 2-2		
1	S2 CLOCK-INT-EXT two-position slide switch.	Selects internal clock as time reference and applies 1 MHz, 100 millivolts rms into 50 ohms at J11 when in the INT (up) position. Selects external clock as time reference and requires 1 MHz, 50 millivolts rms (min) into 50 ohms at J11 when in the EXT (down) position.
2	J12-IF OUTPUT connector.	Provides access to 455 kHz if. output at level of 20 millivolts (min) into 50 ohms in agc mode for rf signals greater than 3 microvolts.
3	R1-LINE AUDIO LEVEL 25 K variable, 1 W potentiometer.	Adjusts line audio level at output connector J14.
4	F1 fuse, 1A, 3AG, slo blo cartridge.	Provides over-current protection for one side of ac input line.
5	F2 fuse, same as F1.	Provides over-current protection for other side of ac input not protected by fuse F1.
6	J11-1 MHz-REF connector.	Provide access to external 1 MHz reference.

Table 2-2. Operator Turn-on Procedure

Procedure	Normal indication
1. Determine primary power voltage.	---
2. Verify correct positions of voltage select switches S3 and S4.	---
3. Ensure that primary power cord is secure at both receiver and power outlet.	---
4. Depress POWER PUSH ON/OFF switch S1.	Red indicator is visible. MEGAHERTZ readout is lit.

Table 2-3. Am. Signal Detection Mode

Step	Procedure	Indication	Reference Figure 2-1
1	Turn on receiver power by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a red indicator.	Item 14
		Tuned frequency MEGAHERTZ readout illuminates.	Item 5
2	Select am. detection mode by depressing the DETECTION MODE-AM pushbutton.	Am. pushbutton displays a yellow indicator.	Item 8
3	Select desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons.	Selected bandwidth pushbutton displays a yellow indicator.	Item 9
4	Select the proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
5	Select signal strength monitoring by depressing METER-SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 1

Table 2-3. Am. Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
6	Select manual gain mode by depressing GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
7	Tune to desired frequency, using the manual tuning knob.	Tuned frequency MEGAHERTZ readout changes as the tuned frequency changes.	Item 5
		Meter indicates relative signal strength. Tune for maximum.	Item 2
8	If it is desired to change signal strength, adjust using RF GAIN knob.	Indication on meter varies as the gain knob is rotated.	Item 2
9	Select GAIN MODE-AGC-FAST.	FAST pushbutton displays a yellow indicator.	Item 3
10	If signal is to be monitored by operator, plug headphones into front panel PHONES jack.	None.	Item 13
11	Adjust PHONE LEVEL control to a comfortable level.	Audio output in headphones.	Item 10
12	If desired, the audio level from audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
13	To receive a different am. frequency, repeat steps 4 through 12.	---	---
14	If the receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
15	If no further use is to be made of the receiver at this time, turn receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator.	Item 14
		Tuned frequency MEGAHERTZ readout goes dark.	Item 5

Table 2-4. Fm Signal Detection Mode

Step	Procedure	Indication	Reference Figure 2-1
1	Turn on receiver power by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a red indicator.	Item 14
		Tuned frequency MEGAHERTZ readout illuminates.	Item 5
2	Select fm detection mode by depressing the DETECTION MODE-FM pushbutton.	FM pushbutton displays a yellow indicator.	Item 8
3	Select desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons.	Selected bandwidth pushbutton displays a yellow indicator.	Item 9
4	Select the proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
5	Select signal strength monitoring by depressing the METER-MAN SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 1
6	Select the manual gain mode by depressing the GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
7	Tune to the desired frequency, using manual tuning knob.	Tuned frequency MEGAHERTZ readout changes as the tuned frequency changes.	Item 5
		Meter indicates relative signal strength. Tune for a maximum indication.	Item 2
8	If it is desired to change the signal strength, adjust using RF GAIN knob.	Indication on the meter varies as the gain knob is rotated.	Item 2
9	Select GAIN MODE-AGC-FAST.	FAST pushbutton displays a yellow indicator.	Item 3
10	If signal is to be monitored by operator, plug headphones into front panel PHONES jack.	None.	Item 13

Table 2-4. Fm Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
11	Adjust PHONE LEVEL control to a comfortable level.	Audio output in headphones.	Item 10
12	If desired, audio level from audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
13	To receive a different fm frequency, repeat steps 4 through 12.	---	---
14	If receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
15	If no further use is to be made of the receiver at this time, turn the receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator. Tuned frequency MEGAHERTZ readout goes dark.	Item 14 Item 5

Table 2-5. CW Signal Detection Mode

Step	Procedure	Indication	Reference Figure 2-1
1	Turn on receiver power by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a red indicator.	Item 14
2	Select the cw detection mode by depressing the DETECTION MODE-CW pushbutton.	CW pushbutton displays a yellow indicator.	Item 8
3	Select desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons.	Selected bandwidth pushbutton displays a yellow indicator.	Item 9
4	Select the proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
5	Select signal strength monitoring by depressing the METER-SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 1
6	Select manual gain mode by depressing the GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
7	Tune to desired frequency using the manual tuning knob.	Tuned frequency MEGAHERTZ readout changes as the tuned frequency changes.	Item 5
		Meter indicates the relative signal strength. Tune for a maximum indication.	Item 2
8	If it is desired to change signal strength, adjust using the RF GAIN knob.	Indication on the meter varies as the gain knob is rotated.	Item 2
9	Select GAIN MODE-AGC-SLOW.	SLOW pushbutton displays a yellow indicator.	Item 3
10	Select KILOHERTZ-BFO OFFSET as desired.	KILOHERTZ-BFO OFFSET switches show the selected value.	Item 4

Table 2-5. Cw Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
11	If signal is to be monitored by operator, plug headphones into front panel PHONES jack.	None.	Item 13
12	Adjust PHONE LEVEL control to a comfortable level.	Audio output in the headphones.	Item 10
13	If desired, the audio level from the audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
14	To receive a different cw frequency, repeat steps 4 through 13.	---	---
15	If the receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
16	If no further use is to be made of the receiver at this time, turn receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator. Tuned frequency MEGAHERTZ readout goes dark.	Item 14 Item 5

Table 3-6. Usb Signal Detection Mode - Continued

Step	Procedure	Indication	Reference Figure
1	Turn on receiver power by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a yellow indicator.	Item 14
2	Select usb detection mode by depressing the DETECTION-MODE-USB pushbutton.	USB pushbutton displays a yellow indicator.	Item 8
3	Select the proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
4	Select signal strength monitoring by depressing the METER-SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 13
5	Select manual gain mode by depressing the GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
6	Tune to desired frequency using the manual tuning knob.	Tuned frequency MEGAHERTZ readout changes as the frequency changes.	Item 5
		Meter indicates relative signal strength. Tune for a maximum indication.	Item 2
7	If it is desired to change signal strength, adjust using the RF GAIN knob.	Indication on meter varies as the gain knob is rotated.	Item 2
8	Select GAIN MODE-AGC-SLOW.	SLOW pushbutton displays a yellow indicator.	Item 3
9	If signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 13
10	Adjust PHONE LEVEL control to a comfortable level.	Audio output in the headphones.	Item 10

Table 2-6. Usb Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
11	If desired, audio level from the audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
12	If receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
13	To receive a different usb frequency, repeat steps 3 through 12.	---	---
14	If no further use is to be made of the receiver at this time, turn the receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator. Tuned frequency MEGAHERTZ readout goes dark.	Item 14 Item 5

Table 2-7. Lsb Signal Detection Mode

Step	Procedure	Indication	Reference Figure 2-1
1	Turn on receiver power by depressing POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a red indicator. Tuned frequency MEGA-HERTZ readout illuminates.	Item 14 Item 5
2	Select lsb detection mode by depressing the DETECTION MODE-LSB pushbutton.	LSB pushbutton displays a yellow indicator.	Item 8
3	Select the proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
4	Select signal strength monitoring by depressing the METER-SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 1
5	Select manual gain mode by depressing the GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
6	Tune to desired frequency using the manual tuning knob.	Tuned frequency MEGA-HERTZ readout changes as the tuned frequency changes. Meter indicates relative signal strength. Tune for maximum indication.	Item 5 Item 2
7	If it is desired to change signal strength, adjust using the RF GAIN knob.	Indication on the meter varies as the gain knob is rotated.	Item 2
8	Select GAIN MODE-AGC-SLOW.	SLOW pushbutton displays a yellow indicator.	Item 3
9	If signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 13

Table 2-7. Lsb Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
10	Adjust PHONE LEVEL control to a comfortable level.	Audio output in headphones.	Item 10
11	If desired, the audio level from the audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
12	If the receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
13	To receive a different lsb frequency, repeat steps 3 through 12.	---	---
14	If no further use is to be made of the receiver at this time, turn the receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator.	Item 14
		Tuned frequency MEGAHERTZ readout goes dark.	Item 5

Table 2-8. Isb Signal Detection Mode

Step	Procedure	Indication	Reference Figure 2-1
1	Turn on receiver power by depressing POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a red indicator.	Item 14
		Tuned frequency MEGAHERTZ readout illuminates.	Item 5
2	Select isb detection mode by depressing the DETECTION MODE-ISB pushbutton.	ISB pushbutton displays a yellow indicator.	Item 8
3	Select proper tuning resolution pushbutton for the tuning resolution desired.	Tuning resolution pushbutton displays a green indicator.	Item 6
4	Select signal strength monitoring by depressing the METER-SIGNAL STRENGTH pushbutton.	SIGNAL STRENGTH pushbutton displays a yellow indicator.	Item 1
5	Select manual gain mode by depressing the GAIN MODE-MAN pushbutton.	MAN pushbutton displays a yellow indicator.	Item 3
6	Tune to desired frequency using the manual tuning knob.	Tuned frequency MEGAHERTZ readout changes as the tuned frequency changes.	Item 5
		Meter indicates relative signal strength. Tune for a maximum indication.	Item 2
7	If it is desired to change signal strength, adjust using the RF GAIN knob.	Indication on the meter varies as the gain knob is rotated.	Item 2
8	Select GAIN MODE-AGC-SLOW.	SLOW pushbutton displays a yellow indicator.	Item 3
9	If signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 13

Table 2-8. Isb Signal Detection Mode-Continued

Step	Procedure	Indication	Reference Figure 2-1
10	Adjust PHONE LEVEL control to a comfortable level.	Audio output in headphones.	Item 10
11	If desired, the audio level from the audio output connector on rear panel may be monitored by depressing the METER-LINE AUDIO pushbutton.	LINE AUDIO pushbutton displays a yellow indicator.	Item 1
12	If the receiver is to remain at this tuned frequency, depress the DSBL/RMT pushbutton to disable the tuning knob.	DSBL/RMT pushbutton displays a yellow indicator.	Item 6
13	To receive a different isb frequency, repeat steps 3 through 12.	---	---
14	If no further use is to be made of the receiver at this time, turn the receiver off by depressing the POWER PUSH ON/OFF pushbutton.	POWER PUSH ON/OFF pushbutton displays a black indicator. Tuned frequency MEGAHERTZ readout goes dark.	Item 14 Item 5

Table 2-9. Operators Maintenance Schedule

Periodicity*	Maintenance Action	Reference
D	Visual inspection	Para 2-4a
W	External cleaning	Para 2-4b
As Required	Equipment tuning	Tables 2-3 through 2-8

*D represents daily, W represents weekly.

CHAPTER 3

FUNCTIONAL DESCRIPTION

3-1. INTRODUCTION. This chapter contains functional descriptions of the receiver. It is divided into three sections covering the overall functional level, detailed functional level, and circuit level, respectively. Refer to the overall block diagram, figure 3-1, during the following discussion.

SECTION I. OVERALL FUNCTIONAL LEVEL

3-2. RF AND IF. SECTIONS. Signals enter the receiver via the rf input connector on the rear panel. The rf filter (A2) accepts signals between 5 kHz and 30 MHz. These signals are passed to the input converter (A3) where the tuned frequency band is translated to the band about the 10.7 MHz if. This if. bandwidth is 16 kHz. The 10.7 MHz if. is fed to the if. section (A4) where it is further translated to the band about the 455 kHz if. The bandwidth of this if. is selectable from the front panel. The 455 kHz if. is demodulated in the am., fm, cw, usb, lsb or isb mode. Selection of the detection mode is made via the front panel. Audio from the selected detection mode is fed through the switchable attenuator (A11) and output transformer (T2) which is applied to the line audio output on the rear panel. In the isb detection mode, the line audio output is the audio from the usb. The audio from the lsb in the isb mode is fed through switchable attenuator (A12) and is applied to the isb audio output connector on the rear panel. In the am., fm or cw detection modes the 455 kHz if. bandwidth is selectable from the front panel to be .3, 1.0, 3.2, 6.0 or 16 kHz. In the usb, lsb and isb modes the if. bandwidth is fixed and therefore the front panel if. bandwidth selection is inoperable. The output from the fm/cw/ssb detector is applied to the rear panel as the fm/cw/ssb detector output monitor. The 455 kHz if. is also applied to the rear panel. Receiver gain is controlled from the front panel and may be selected for manual, age fast or age slow. In manual, the RF GAIN knob on the front panel controls the gain.

3-3. SYNTHESIZER SECTION. The synthesizer section (A5) contains four synthesizers and a time base. Three synthesized local oscillators supply the signals required to translate all rf input signals to the 455 kHz if. When operating in a cw or ssb mode, the fourth (bfo) synthesizer beats with the 455 kHz if. to produce an audio output. The time base is derived from an internal or optional external reference.

3-4. CONTROL SECTION. Receiver parameters are controlled from the front panel through the manual tuning up/down counter (A6A1) and the front panel interconnect (A6A2) on the io/motherboard (A6). The manual tuning up/down counter contains the rf frequency data. This information is sent to the synthesizer section and is also encoded for multiplexing to the frequency display. Frequency data is changed by the manual tuning module (A7) on the front panel. The manual tuning module is connected to the manual tuning up/down counter and controls the direction and rate of change of the tuned frequency.

a. Frequency Display. The MEGAHERTZ frequency display (A8) accepts the multiplexed information from the up/down counter and displays it on the seven digits of the front panel located display.

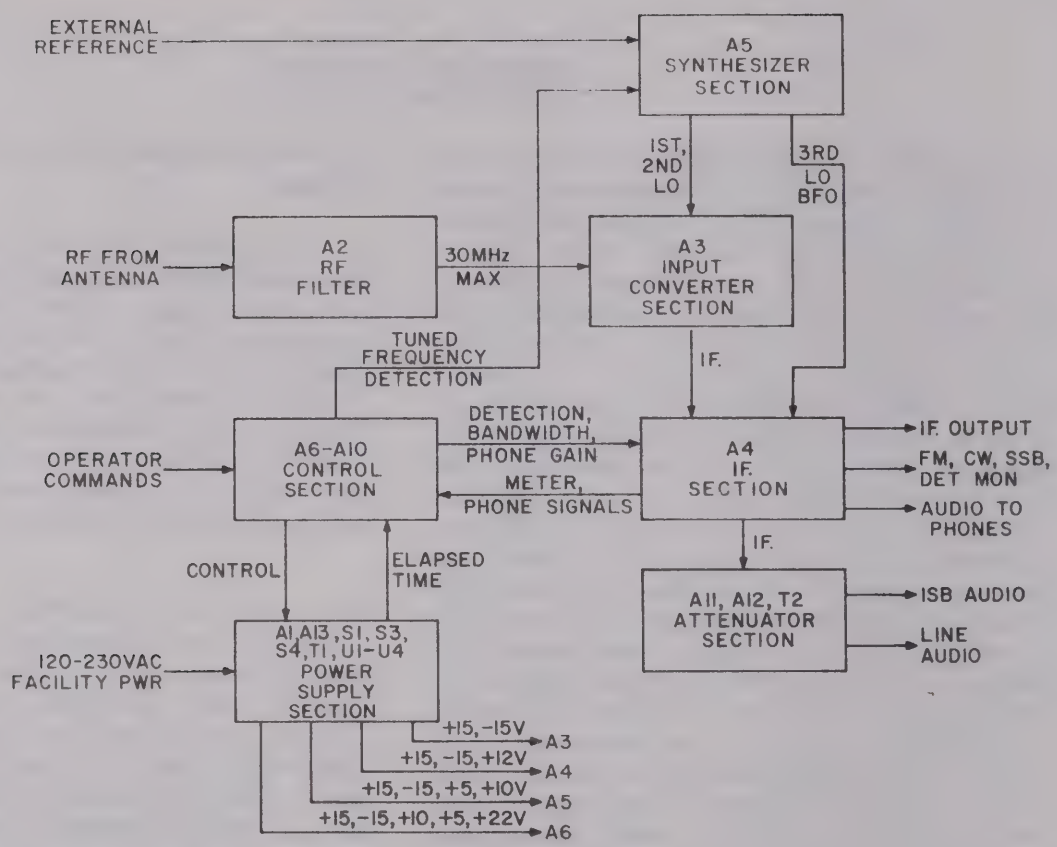


Figure 3-1. Receiver Overall Functional Block Diagram

b. KILOHERTZ-BFO OFFSET Switch. This switch (A9) provides a variation of 0.0 ±8.9 kHz from 455 kHz. It gives a direction of offset and a selectable amount. A zero setting in the directional control will automatically return the bfo to 455 kHz.

c. Front Panel Controls. The front panel controls (A10A1 and A10A2) allow manual selection of detection mode, gain mode, meter mode, if. bandwidth, rf gain, and headphone level. Audio is available at the front panel PHONES jack and the level is controlled by the PHONE LEVEL control.

3-5. POWER SUPPLY SECTION. The receiver may be operated from either 115 or 230 Vac. The power supply section of the receiver accepts the input voltage via a filter assembly, the input fuses, a voltage selector and the power switch. The input voltage passes to the receiver's power transformer, which then supplies two lesser ac voltages to the power distribution board. Through the use of rectifiers and voltage regulators, these ac voltages are converted to +15, -15, +5, +12 Vdc and unregulated +10 Vdc, which are, in turn, supplied to the various units of the receiver. When the power supply is on, a voltage is supplied to activate the elapsed time meter on the front panel.

SECTION II. DETAILED FUNCTIONAL LEVEL

3-6. INTRODUCTION. This section describes the operation of the various assemblies/sections of the receiver as shown on the accompanying block diagrams. Certain units, due to their inherent simplicity do not have block diagrams included.

3-7. RF FILTER (A2). The rf filter is shown in the overall block diagram, figure 3-1 and in the schematic diagram figure FO-2. The rf filter is composed of a toroidal coil, and a 30 MHz low pass filter.

3-8. INPUT CONVERTER (A3). This unit is made up of the 1st and 2nd mixers, the 1st and 2nd if. filters, a filterboard, the 1st and a portion of the 2nd if. amplifier. See block diagram, figure 3-2, and the input converter schematic diagram, figure FO-3. The 1st mixer receives signals from the rf filter (A2) and an input from the 1st lo synthesizer which shifts the rf signal up in frequency to produce the 1st if. which is in the range 42.90000 to 42.91000 MHz. This signal is amplified and filtered by the 28 kHz bandwidth band-pass 1st if. filter. It then passes through a filter board (A3A3) and is amplified before passing into the 2nd mixer, where, with the appropriate input (in the range 32.20000 to 32.21000 MHz) from the 2nd lo synthesizer, the rf signal is down converted to 10.7 MHz. This signal is then amplified and further filtered by the 16 kHz bandwidth band-pass 2nd if. filter. The overall net gain of the input converter is approximately +12 dB. The relationships between the tuned frequency, 1st lo, 1st if., 2nd lo and 2nd if. will be described further in paragraphs 3-11 and 3-32.

3-9. IF. SECTION (A4). The if. section, mounted on motherboard A4, is composed of four filter switches, three detector boards, two audio amplifiers, an age circuit and a 10.7 MHz to 455 kHz converter. See figure 3-3.

a. 10.7 MHz Filter Switch (A4A1). This switch receives the 10.7 MHz signal from the input converter, (A3). At this point, the if. bandwidth has been set at 16 kHz by the 2nd if. filter in the input converter. The 10.7 MHz filter switch contains band-pass filters for 6 and 3.2 kHz bandwidth. This circuit routes the if. signal through one of these filters or through a wideband path, which allows the full 16 kHz bandwidth to pass, as determined by the if. bandwidth selection.

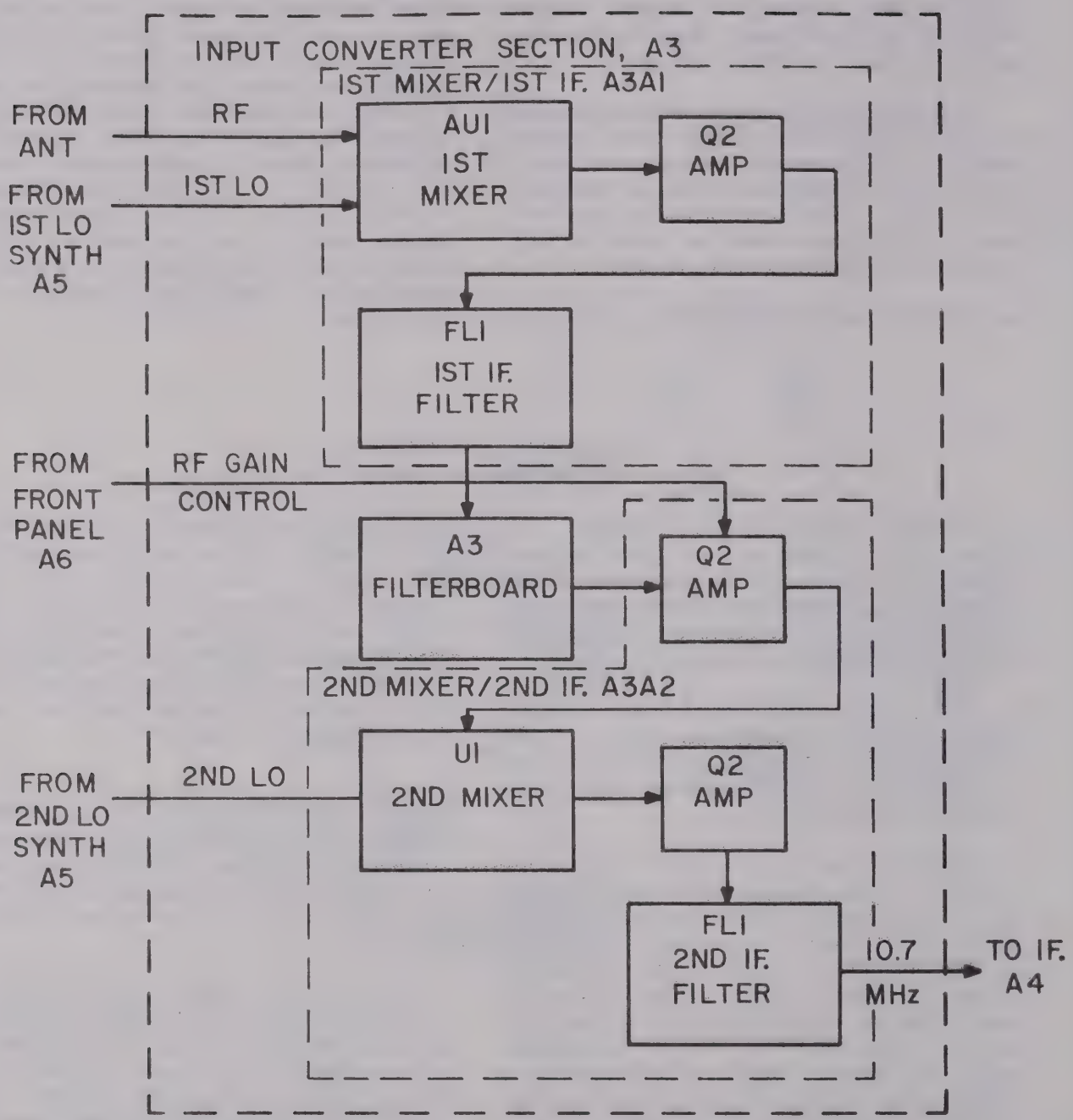


Figure 3-2. Input Converter Functional Block Diagram

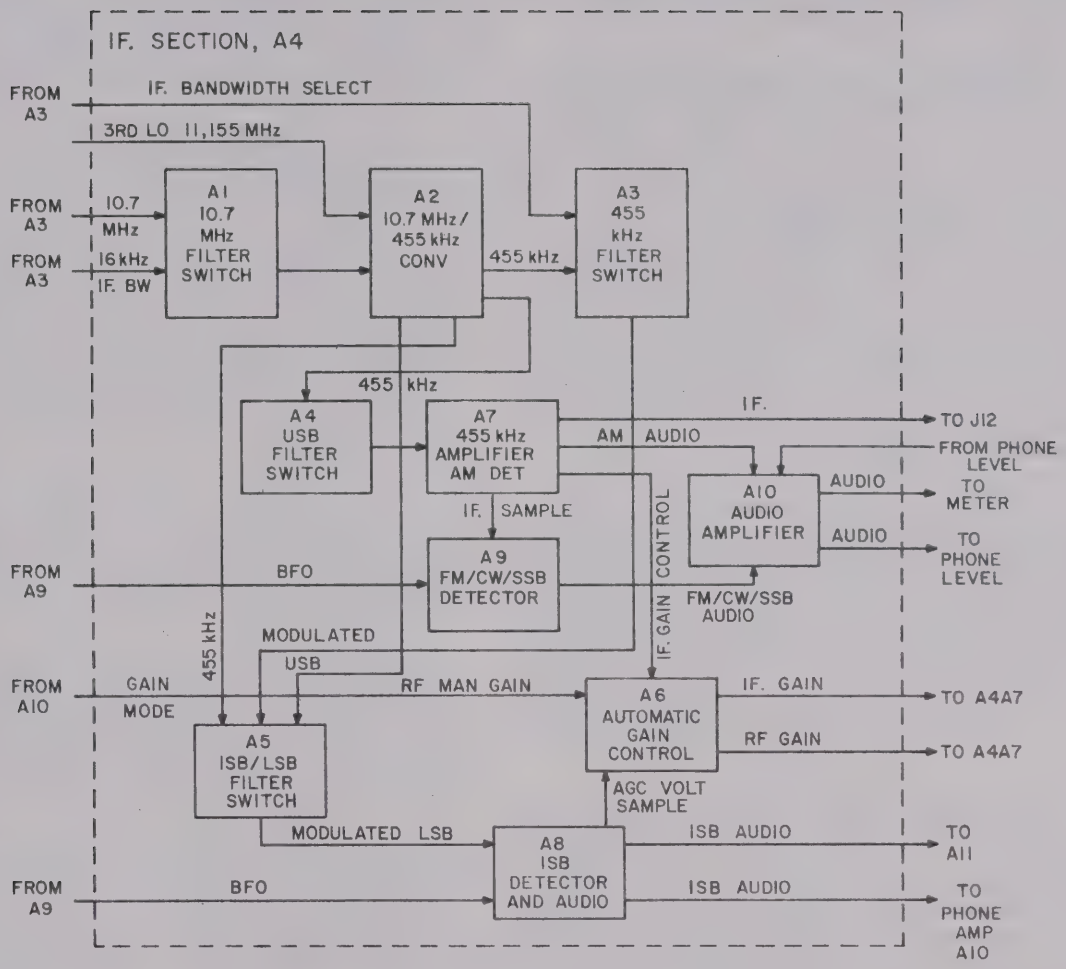


Figure 3-3. If. Section Functional Block Diagram

b. 10.7 MHz/455 kHz Converter (A4A2). This unit, also called the 3rd mixer, converts signals from 10.7 MHz to 455 kHz. The 3rd lo signal is applied at a fixed frequency of 11.155 MHz and a level of approximately -6 dBm, and is amplified to roughly +7 dBm before entering the mixer. The converter output is fed in parallel to the 455 kHz, usb and isb/lsb filter switches.

c. 455 kHz Filter Switch (A4A3). The 455 kHz filter switch is similar in function to the 10.7 MHz filter switch. Both contain three possible signal paths, two with crystal filters and one with broad bandwidth. There are, however, important differences between the two filter switches. Two of the bandwidths are .3 and 1.0 kHz. When the broad bandwidth path is energized the overall receiver bandwidth is controlled by either the 10.7 MHz filter switch or the input converter. In the 455 kHz filter switch all paths are off when the usb or lsb filters are selected.

d. Usb Filter Switch (A4A4). The usb filter switch connects into the 455 kHz if. signal path, in parallel with the 455 kHz filter switch. When the receiver is operating in either the usb mode or the isb mode, the upper sideband modulation is passed in this circuit and sent to the 455 kHz amplifier/am. detector (A4A7). The upper sideband filter has a bandpass extending from 455.25 kHz to 458.2 kHz.

e. Isb/Lsb Filter Switch (A4A5). The isb/lsb filter switch connects into the 455 kHz if. signal path, in parallel with the 455 kHz filter switch. The circuit has two signal outputs, one to the 455 kHz amplifier/am. detector (A4A7), and one to the isb detector and audio (A4A8). When the receiver is operating in the lsb detection mode, the lower sideband modulation is applied to the 455 kHz amplifier/am. detector (A4A7). When the receiver is in the isb detection mode, the lower sideband modulation is applied to the isb detector and audio (A4A8). The lower sideband filter has a bandwidth extending from 451.8 kHz to 454.75 kHz.

f. 455 kHz Amplifier/Am. Detector (A4A7). Although received signals are amplified by most of the circuits in the receiver, the majority of the amplification of weak signals takes place in the 455 kHz amplifier of A4A7. Following a two-stage gain controlled amplifier, the input signal is split to provide three outputs: the if. sample which operates the fm/cw/ssb demodulator, the rear panel if. output, and the input to the am. detector. The am. detector, which operates at a relatively high level for good linearity, has its output directly coupled to the age module and the audio amplifier.

g. Fm/Cw/Ssb Detector (A4A9). For fm reception, this module contains a limiter and discriminator. Power for these circuits is supplied when the fm detection mode is selected. For cw or ssb reception, there is a product detector which has its power applied when the cw, usb, lsb, or isb detection modes are selected. Also, when the product detector is energized, the bfo synthesizer is enabled and its output is applied to the product detector.

h. Automatic Gain Control (A4A6). The primary function of the age module is to generate control voltages which adjust the amplification of signals passing through the receiver. When the fast age or slow age gain mode is selected, this module attempts to adjust the receiver's amplification (gain) to maintain a constant output from the am. detector. If the desired signal entering the receiver fades in amplitude, the receiver gain increases just enough to compensate for the fade. When the manual gain mode is selected, the receiver's gain is fixed at a level which depends on the setting of the RF GAIN potentiometer on the front panel. This module, as a secondary function, provides voltage to operate the signal strength meter.

i. Audio Amplifier (A4A10). The audio amplifier receives the audio outputs of the am. detector and fm/cw/ssb detector and feeds them to the LINE AUDIO LEVEL control on the rear panel and the PHONE LEVEL control on the front panel. The signal returned from the LINE AUDIO LEVEL potentiometer drives the line audio amplifier. The signal returned from the PHONE LEVEL control drives the auxiliary

phone amplifier which feeds the phone audio terminals of the audio output connector on the rear panel. The output of the line audio amplifier is supplied to drive the front panel meter.

j. Isb Detector and Audio (A4A8). For isb operation, two independent single sideband signals must be demodulated. Since they share the same carrier frequency, they may be processed together up to a certain point. In the receiver, isb is handled as a single composite signal through the 3rd mixer. At that point it is split, the usb component being filtered and passed through the main signal path, the lsb component filtered and separately amplified and demodulated by the isb detector and audio module. The isb detector and audio module is therefore a combination of circuits similar to those on previously discussed modules. There is a 455 kHz amplifier similar to part of A4A7, a product detector similar to that on A4A9, an age circuit like part of A4A6, and an isb line audio amplifier similar to the auxiliary phone amplifier on A4A10. A sample of the age voltage developed in this module is sent to the main age module to produce a combined rf age.

k. If. Bandwidth Relationships. Table 3-1 shows the bandwidths used in the 10.7 MHz and 455 kHz filter switches for the various receiver if. bandwidths and detection modes selected on the front panel.

l. Detection Mode and Output Signal Relationships. Table 3-2 lists the status of the detectors, bfo and audio output signals for the various detection modes selected on the front panel.

3-10. ATTENUATOR SECTION. Two switchable attenuators and an audio transformer are used in this section. One attenuator is used for line audio output while the second is used for the isb audio output. See figure 3-4 and the audio attenuator schematic diagram, figure FO-21.

a. 16-Ohm Switchable Attenuator (A11). With attenuator switch S1 closed, the attenuator provides a 16-ohm impedance and 30 dB attenuation to the audio transformer (T2). Thus, the line audio output impedance is 600 ohms. With switch S1 open, there is no effect on line audio output. The front panel meter will indicate the dBm level of the line audio output whether switch S1 is in or out.

b. 600-Ohm Switchable Attenuator (A12). With attenuator switch S1 closed, A12 provides a 600-ohm impedance and 20 dB of attenuation to the isb audio output. With switch S1 open, it has no effect on the isb line audio output.

c. Audio Transformer (T2). Audio transformer T2 changes the impedance level from 16 ohms to 600 ohms.

3-11. SYNTHESIZER SECTION (A5). Figure 3-5 is a functional block diagram of the synthesizer section. Figure 3-5 shows the relationship of the synthesizers to the receiver signal processing. Together, three synthesizers translate all rf input signals to 455 kHz. Other stages of the receiver then demodulate the 455 kHz if. If the receiver operates in the cw or a sideband mode, a fourth bfo synthesizer signal beats with the 455 kHz if. to produce an audio output. The tuning process involves the 1st and 2nd lo; the 3rd lo is fixed at 11.155 MHz and the bfo varies ±8.9 kHz from 455 kHz.

a. 1st Lo Synthesizer (A5A1). The 1st lo tunes from 42.91 MHz to 72.90 MHz, in 10 kHz steps, in accordance with the tuned frequency control input. This range corresponds to an rf input range of 00.00000 MHz to 29.99999 MHz. Each 10 kHz step of the 1st lo causes a different 10 kHz section of the rf spectrum to be converted to the 1st if. range (42.90 MHz to 42.91 MHz) by taking the difference products from the 1st mixer. A filter follows the 1st mixer which passes signals in this 10 kHz range, plus their sidebands which extend approximately 9 kHz beyond each end of this range, for a total bandwidth of 28 kHz.

b. 2nd Lo Synthesizer (A5A2). The 2nd lo tunes from 32.21000 MHz to 32.20001 MHz, in 10 Hz steps, in accordance with the tuned frequency control input. This range

Table 3-1. Receiver If. Bandwidth Relationships

Selected detection mode	Selected receiver bandwidth	10.7 MHz if. filter bandwidth	455 kHz if. filter bandwidth
	16 kHz	16 kHz	16 kHz
	6 kHz	6 kHz	16 kHz
Am., fm, or cw	3.2 kHz	3.2 kHz	16 kHz
	1.0 kHz	16 kHz	1.0 kHz
	.3 kHz	16 kHz	.3 kHz
Usb	Bandwidths	16 kHz	Usb (2.95 kHz)
Lsb	are fixed in	16 kHz	Lsb (2.95 kHz)
Isb	these modes	16 kHz	Usb + Lsb

NOTE: The input converter bandwidth is 16 kHz.

Table 3-2. Detection Mode Output Signal Relationships

Detection mode	Am. det	Fm det	Cw det & bfo	Line audio signal	Isb audio signal
Am.	On	Off	Off	Am.	Off
Fm	On	On	Off	Fm	Off
Cw	On	Off	On	Cw	Off
Usb	On	Off	On	Usb	Off
Lsb	On	Off	On	Lsb	Off
Isb	On	Off	On	Usb	Lsb

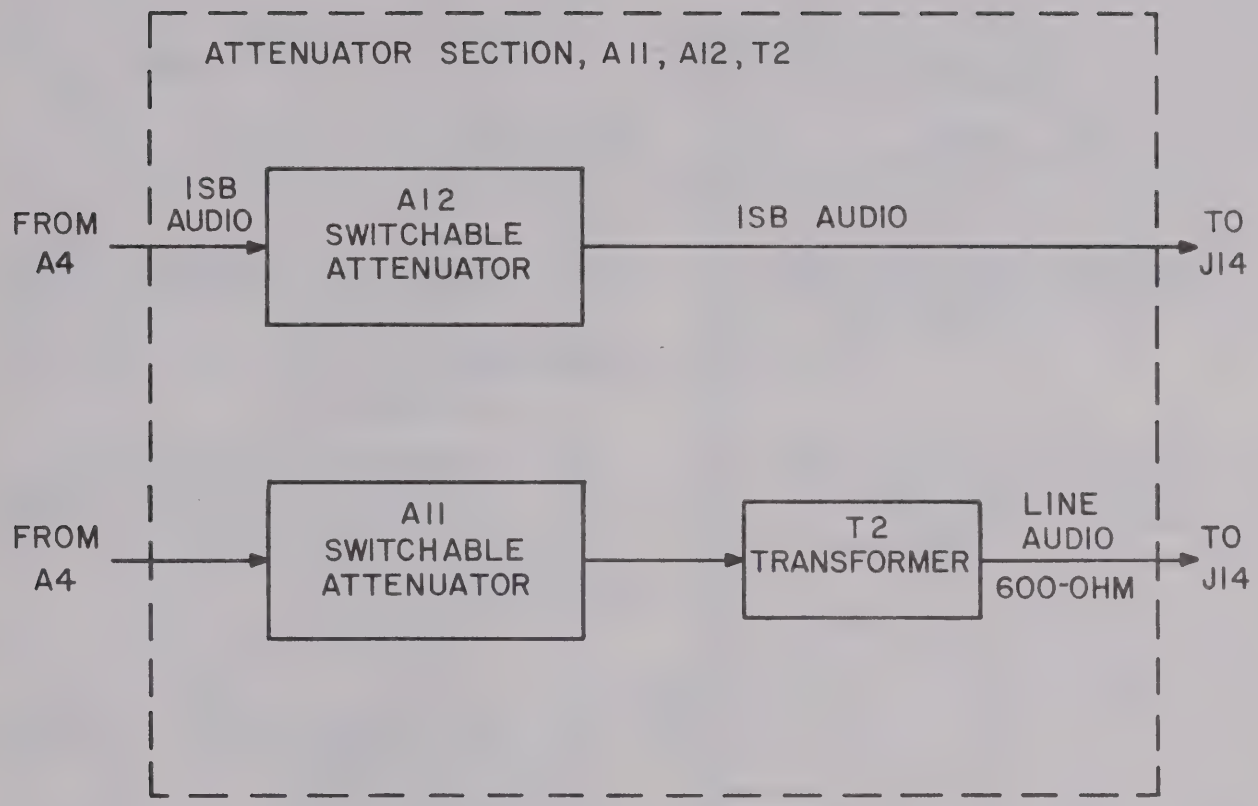


Figure 3-4. Attenuator Section Functional Block Diagram

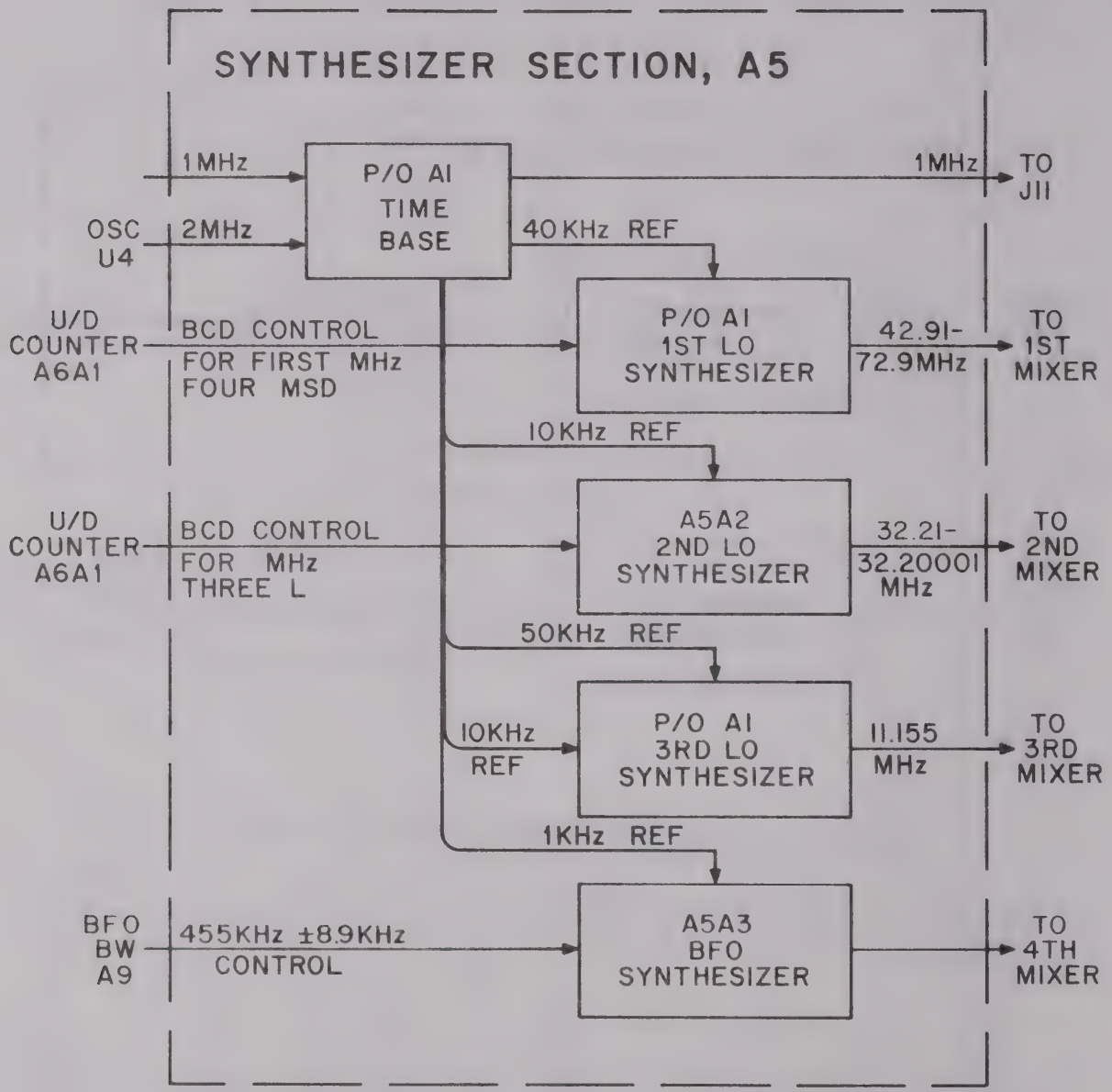


Figure 3-5. Synthesizer Section Functional Block Diagram

allows conversion of any signal in the 1st if. range to the center frequency of the 2nd if. (10.7 MHz), by the 2nd mixer. A 16 kHz bandpass filter follows the 2nd mixer to set the receiver's maximum if. bandwidth. As the receiver is tuned upward, the 2nd lo tunes downward across its entire range, then returns to its starting frequency as the 1st lo steps up to its next increment. This interlocking sweep action allows any 10 Hz increment of the rf range to be converted to the center of the 10.7 MHz 2nd if. passband.

c. 3rd Lo Synthesizer (A5A1). The 3rd lo provides an 11.15500 MHz signal to the 3rd mixer. Signals centered on the 10.7 MHz output from the 2nd mixer mix with the signal from the 3rd lo to produce signals centered at 455 kHz. The output from the 3rd mixer passes through another bandpass filter either to be demodulated by other stages in the receiver or mixed with the bfo output for cw or sideband detection.

d. Bfo Synthesizer (A5A3). The bfo synthesizer produces a signal ranging from 446.1 kHz to 463.9 kHz, in accordance with the bfo offset and detection mode control inputs. This range centers about 455 kHz (±8.9 kHz) and beats with the 455 kHz signal from the 3rd mixer to produce an audio output.

e. Time Base Circuits (A5A1). All four synthesizer circuits are synchronized by a common time base. Reference frequencies of 1 MHz, 50 kHz, 40 kHz, 10 kHz, and 1 kHz are supplied from a 2 MHz temperature compensated crystal oscillator or from a 1 MHz external source input at rear panel jack J11. The rear panel INT/EXT CLOCK switch S2 allows selection of the internal or external reference. When in the internal mode, the 1 MHz internal reference is available at the rear panel jack J11.

3-12. CONTROL SECTION. The control section is composed of the manual tuning up/down counter, the front panel interconnect, the manual tuning module, the frequency display, the bfo switch, the upper panel control and the lower panel control. Figure 3-6 shows the overall relationship of these units.

a. Manual Tuning Up/Down Counter (A6A1). The manual tuning up/down counter contains the rf frequency data. This information is sent to the 1st and 2nd lo synthesizers and is encoded for multiplexing to the display board. The frequency data is changed by means of the manual tuning module on the front panel.

b. Front Panel Interconnect (A6A2). The front panel interconnect module translates information received from the front panel into control information for the receiver. Front panel information entering the module controls detection mode, gain mode, meter mode, and if. bandwidth, in addition to headphone and rf gain levels. The information is then decoded for use in the if. stages of the receiver. Two output lines from the front panel interconnect, however, control the bfo for the various detection modes.

c. Manual Tuning Module (A7). The manual tuning module controls the direction and rate of change of the tuned frequency. The module connects to the manual tuning up/down counter (A6A1) and is mounted behind the receiver's front panel. The manual tuning module consists of two parts, the encoder assembly and the tuning resolution switches. The encoder assembly converts tuning knob rotation into digital pulses for the manual tuning up/down counter. When the knob is rotated clockwise it will increase tuned frequency, counterclockwise it will decrease it. The tuning resolution switches select the desired tuning step to be used. Switching is accomplished by connecting the desired tuning step to the step select switch line of the manual tuning up/down counter board. Tuning steps available are 10 Hz, 100 Hz, 1 kHz, and 10 kHz. When the DSBL/RMT pushbutton is depressed, the manual tuning module is disabled and rotation of the tuning knob has no effect.

d. Frequency Display (A8). The frequency display accepts the multiplexed information from the manual tuning up/down counter and displays it on the seven front panel LEDs. These are seven-segment com-

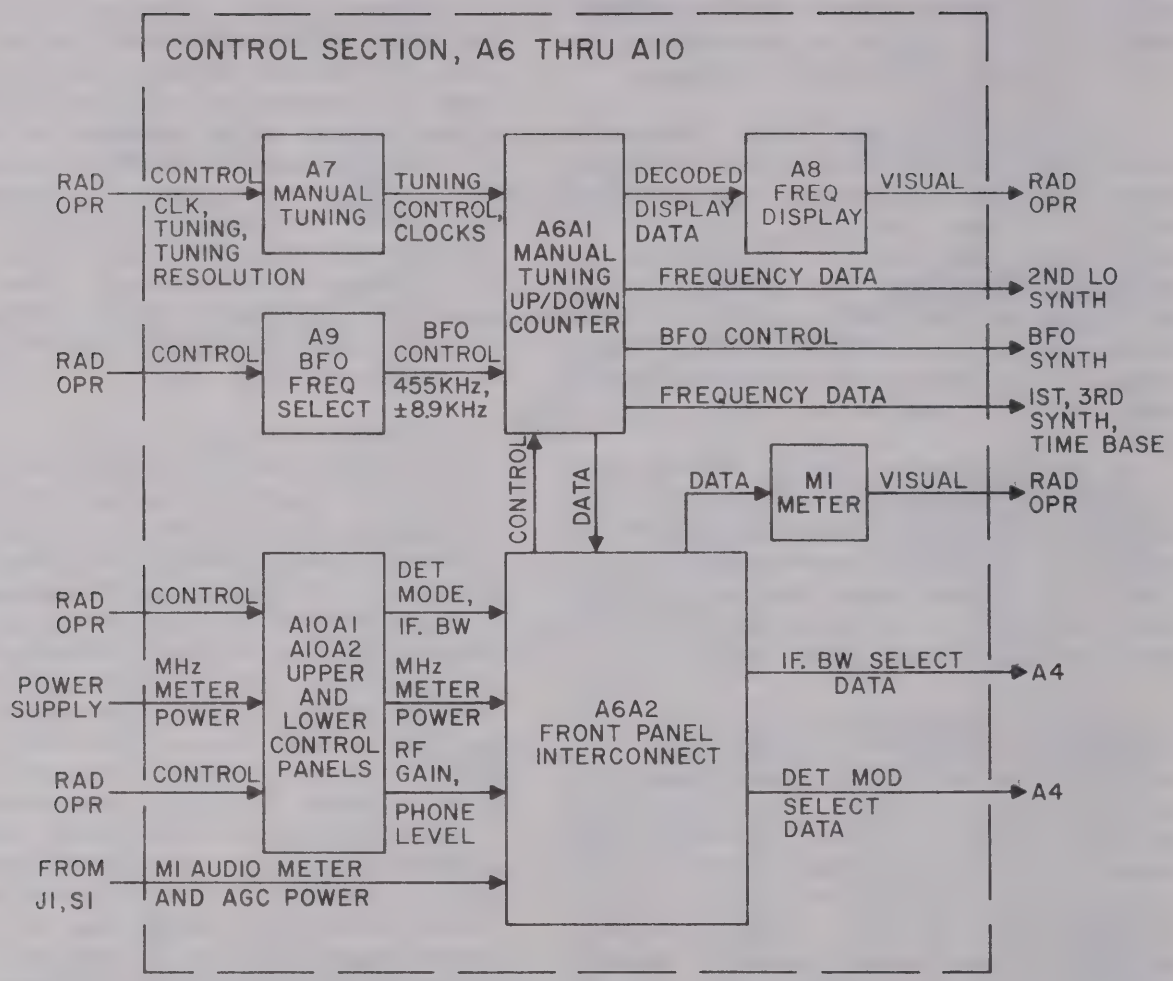


Figure 3-6. Control Section Functional Block Diagram

mon-cathode displays which are controlled by an ic decoder/driver. The up/down counter applies display information to the ic where it is decoded into the proper number and sent to the display in its proper position.

e. Bfo Switch (A9). Three thumbwheel switches provide a bfo variation of ±8.9 kHz from 455 kHz. The +, 0, -, thumbwheel provides the direction of offset, the second thumbwheel varies in range from 0 to 8, and the third thumbwheel varies in range from 0 to 9. A "0" setting of the direction thumbwheel causes the bfo to return automatically to 455 kHz regardless of the other thumbwheel settings.

f. Front Panel Control (A10). The front panel control consists of the upper and lower panel control boards joined by a 40-pin ribbon connector. This connector is attached to the front panel interconnect (A6A2) and controls the manual selection of detection mode, gain mode, meter mode, if. bandwidth, rf gain, and headphone levels. Signals for the phone outputs also connect to the lower panel control through the front panel interconnect.

(1) Upper panel control (A10A1). The upper panel control allows selection of detection mode, gain mode, and meter mode. Each gang of switches mechanically operates to allow only one pushbutton to be depressed at any time. All control lines connect to the front panel interconnect (A6A2).

(2) Lower panel control (A10A2). The lower panel control allows selection of if. bandwidth and variation of rf gain and phone level potentiometers. The card also contains the amplifiers to drive the headphone outputs. The amplifiers operate independently. They both receive the same signal in all detection modes except isb. In isb mode, one amplifier receives the upper sideband information while the other receives the lower sideband information. No damage will be done to the amplifiers when using mono headphones; however, lsb in the isb mode will not be monitored.

3-13. POWER SUPPLY SECTION. See figure 3-7 for the power supply block diagram. The receiver may be operated from either 115 Vac ±15% or 230 Vac ±15%, 48 to 420 Hz. This voltage feeds the power input filter assembly (A13) which contains filter FL1. It then passes through fuses F1 and F2 and through the main power switch, S1. From the switch, current is routed through the voltage selector and into transformer T1. The transformer has a dual primary and center-tapped secondaries and produces outputs of 34 and 16 Vac both of which enter the power distribution board, (A1).

a. Power Distribution (A1). The power distribution board receives the 34 and 16 Vac inputs and rectifies these voltages for various circuits in the receiver. The 34 Vac enters this board, is rectified and filtered and sent to regulators U1, U2 and U4. The 16 Vac is rectified by two diodes located on the rear panel and returned to the distribution board to be filtered and become a +10 V unregulated supply.

b. Power Supply Regulators U1 and U2. Regulators U1 and U2, located on the back of the chassis, provide regulated +15 Vdc and -15 Vdc, respectively. These two voltages are supplied to most of the circuits in the receiver. The unregulated 10 Vdc, with its unregulated ground, connects to U3, a +5 Vdc regulator. U3 supplies +5 Vdc to the bfo and 2nd lo synthesizers, the up/down counter board, and the front panel interconnect card. The unregulated 10 Vdc also connects through other +5 Vdc regulators to provide this voltage to the 1st and 3rd lo synthesizers. U4 provides regulated +12 vdc for the audio amplifier (A4A10). The unregulated input to U4 also goes to activate the front panel elapsed time meter while power is turned on.

3-14. PHASE LOCK LOOPS. The phase lock loop is the method used in this receiver to provide accurate numerical control of the local oscillator frequencies. This technique allows the oscillators to be controlled by any appropriate source of bcd digital data, including remote control sources. The basic phase lock loop is composed of four circuits: a phase detector, a low-pass filter (sometimes called a lead-lag filter, integrator, or

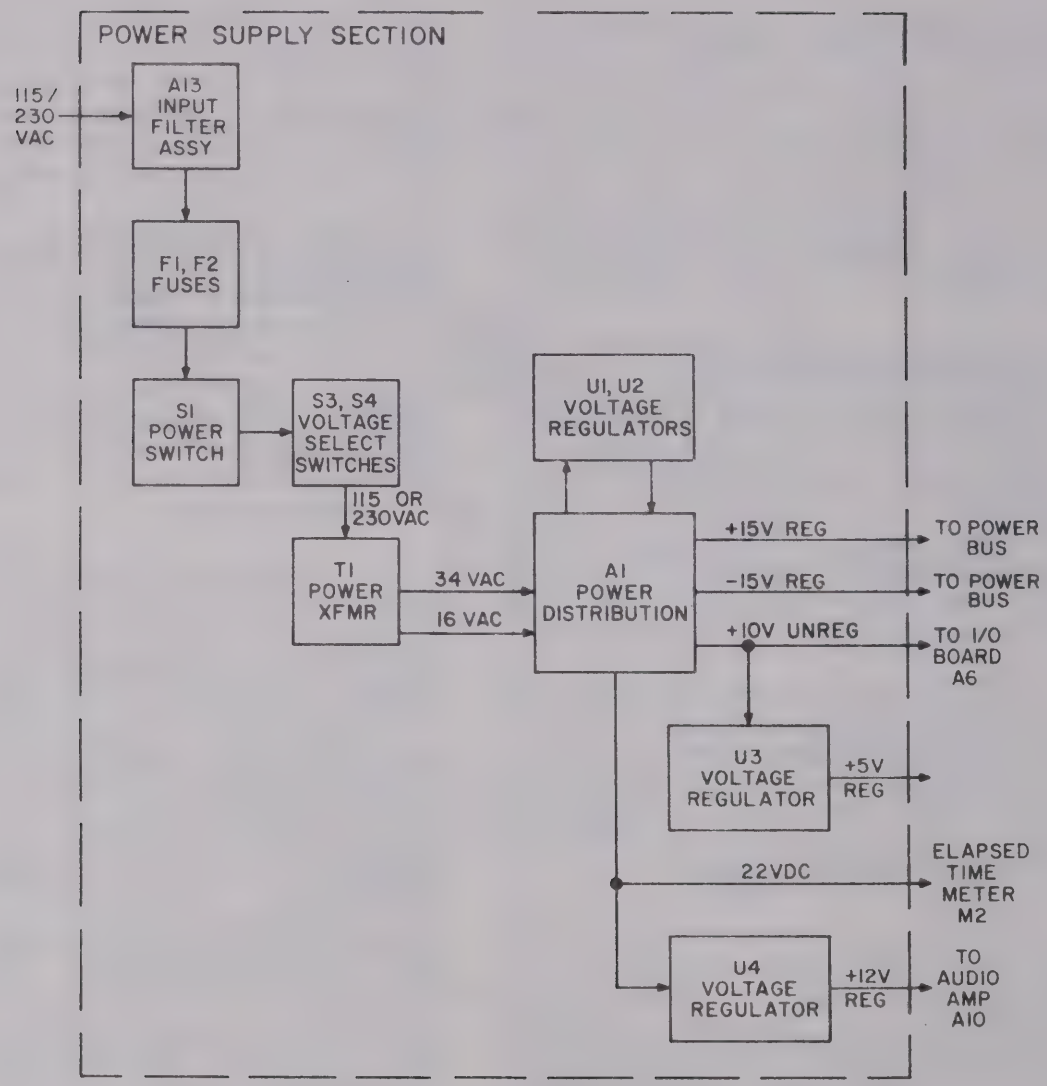


Figure 3-7. Power Supply Section Functional Block Diagram

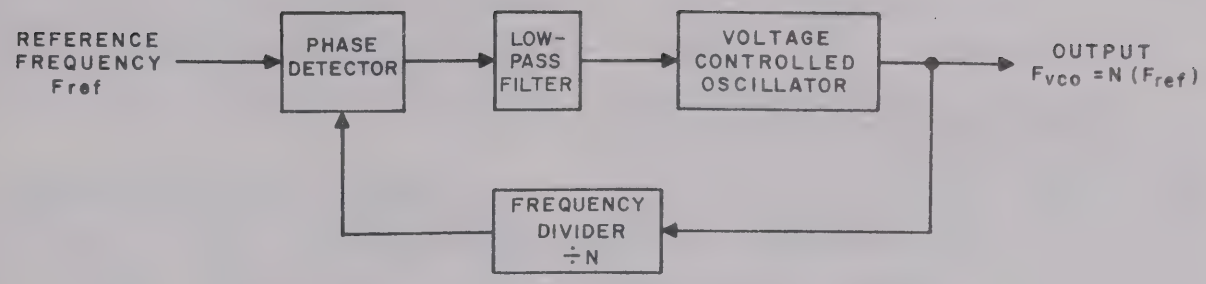


Figure 3-8. Basic Phase Lock Loop Configuration

loop filter), a voltage-controlled oscillator (vco), and a frequency divider (counter). Basic phase lock loop configuration is shown in figure 3-8. Depending on the application, the frequency divider circuit may be fixed (to divide by a certain number), or may be programmable to divide by any number in a specific range (20 to 29, for example). The frequency divider may consist of several counters cascaded together, to provide division by a large number. The operation of the basic phase lock loop requires a stable fixed frequency source, to be used as the reference frequency. This receiver contains a temperature-compensated crystal oscillator (tcxo) to provide the basic reference frequency (F_{ref}), and may also be operated using an externally supplied 1 MHz reference signal. Both fixed and programmable loops are discussed in the following paragraphs.

a. Basic Phase Lock Loop Technique. The basic phase lock loop technique compares the frequency and phase of an incoming reference signal to the output of the voltage controlled oscillator (vco). If the two signals differ in frequency and/or phase, an error voltage is generated by the phase detector/filter and applied to the vco, causing it to correct in the direction required to decrease the frequency/phase difference. The phase detector produces output pulses which are related to the frequency/phase difference. The filter circuit averages (integrates) these pulses into a proportional error correction voltage. This voltage is applied to control the capacitance of a varicap diode in the vco circuit, and thus tune the vco toward the correct frequency. The correction procedure continues until lock is achieved, after which the vco will track the incoming reference signal.

b. VCO Output Frequency. Dividing a vco output by two before applying it to the phase detector results in an error voltage that drives the vco to twice the reference frequency. A divide-by-3 action results in an error voltage that drives the vco to three times the reference frequency. Thus, the

reference frequency is always multiplied by the divider ratio to give the vco output frequency. From this, the following relationship can be given:

$$F_{vco} = N\ (F_{ref})$$

c. Phase Lock Loop Function. To simplify the functional description of the phase lock loop, numbers are assigned to the phase lock loop reference frequency, its output frequency, and its divider selectable inputs. See figure 3-9. A portion of the phase lock loop 25 MHz output is looped back through a divider which is set at divide-by-25. The divider emits a pulse for every 25 it counts. Therefore, the divider output has a frequency of 1 MHz.

d. Phase Lock Loop Prescaling Technique. A variation of the basic phase lock loop, shown in figure 3-10, is utilized in the 1st and 2nd lo synthesizers. The divider portion consists of two modulus prescaler and two programmable counters. The two-modulus (divider) prescaler accepts the output from the vco and divides it by one of two numbers (P or P+1). The prescaler in the 1st lo is a divide-by-50/51 counter and the 2nd lo prescaler is a divide-by-100/101 counter. The swallow counter controls the number of times the prescaler divides by P+1. The programmable counter counts the number of pulses from the prescaler. Totally, these three components provide for coarse (N) and fine (A) tuning of the vco.

e. Prescaler Operation. In operation, the prescaler divides by P+1, A number of times. For every P+1 pulse from the prescaler, both the swallow counter and programmable counter are decremented by 1. The prescaler divides by P+1 until the swallow counter reaches its zero state. At this point, the modulus of the prescaler changes to P and the swallow counter is disabled. The prescaler then divides by P until the remaining count in the programmable counter (N-A) decrements to zero. At this time the output of the programmable counter emits a pulse while the swallow and programmable counters are reset. The cycle then repeats.

f. Two-Modulus Prescaler. An example of the two-modulus prescaling technique is given in figure 3-11. For illustration, a vco output of 153 MHz is desired. Selected into the programmable counter are the two most significant digits, 1 and 5. Selected into the swallow counter is the least significant digit, 3. Under lock conditions, the divider has an input of 153 MHz and an output of 1 MHz.

g. Prescaler Counting Sequence. To produce a 1 MHz signal from a 153 MHz signal requires a divide ratio of 153. Table 3-3 shows a count sequence with 153 input pulses resulting in one output pulse. Similarly, a 153 MHz input results in a 1 MHz output. The programmable counter emits a pulse every time it counts 15 pulses. With the swallow counter set to three, the prescaler divides-by-11 three times and then switches to the divide-by-10 state. At this point, the programmable counter needs 12 input pulses before emitting an output pulse. The prescaler then divides-by-10 twelve times to finish the count sequence. With 3 counts of 11 (3x11=33), and 12 counts of 10 (12x10=120), one output pulse emits from the programmable counter every 153 input pulses (33+120=153).

Table 3-3. Prescaler Counting Sequence

Program counter	Swallow counter	Prescaler counts	Input pulses
15	3	0	0
14	2	11	11
13	1	11	22
12	0	11	33
11	-	10	43
10	-	10	63
9	-	10	73
8	-	10	83
7	-	10	93
6	-	10	103
5	-	10	113
4	-	10	123
3	-	10	133
4	-	10	143
5	-	10	153

153 Input Pulses = 1 Output Pulse

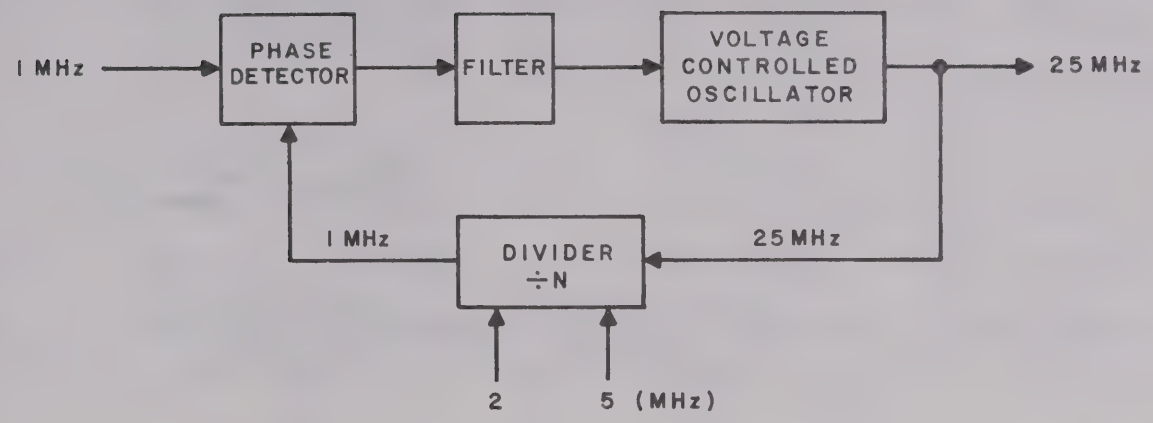


Figure 3-9. Programmable Phase Lock Loop

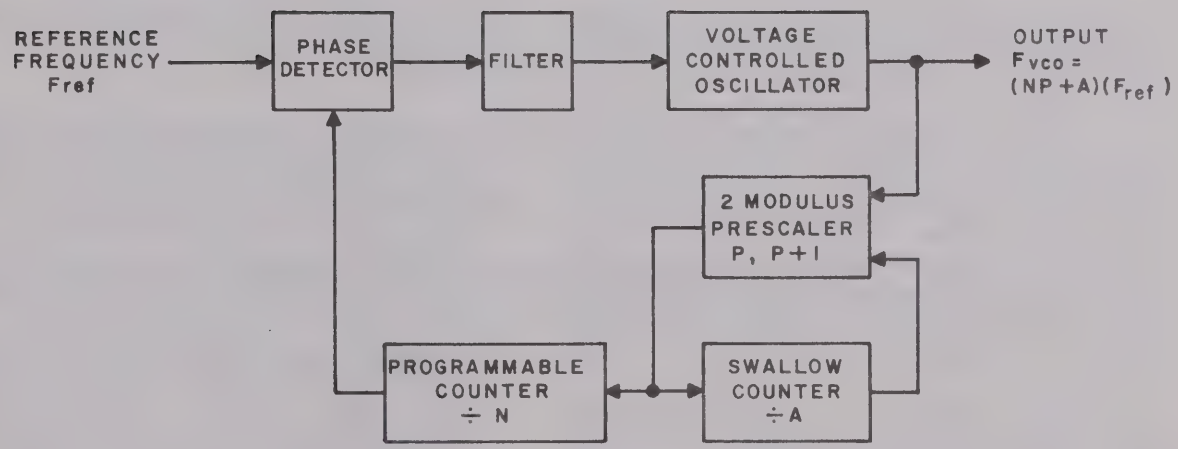


Figure 3-10. Two-Modulus Prescaling in the Phase Lock Loop

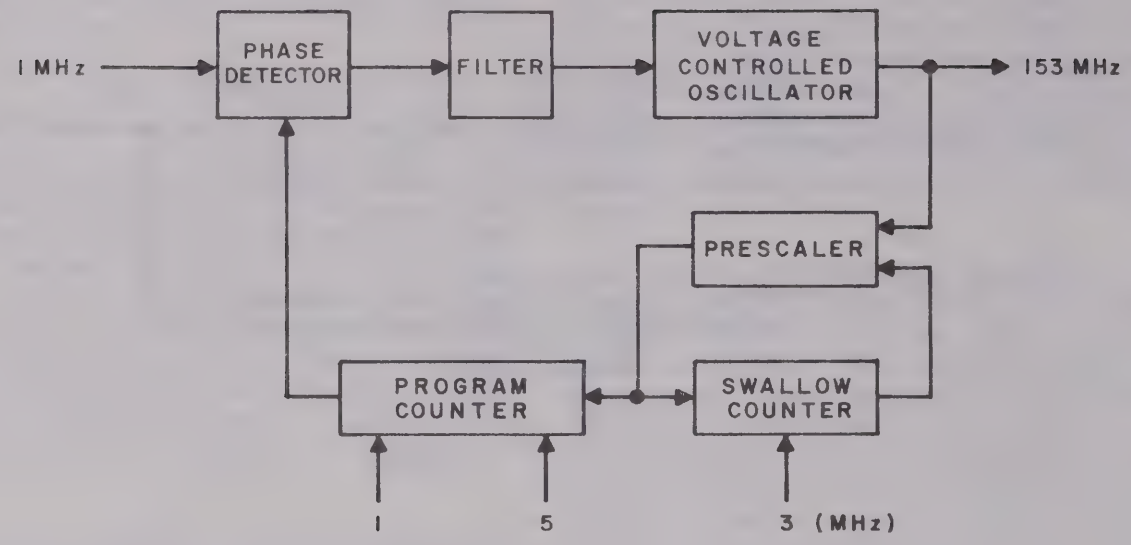


Figure 3-11. Prescaler Dividing Technique

h. Bfo Phase Lock Loop Configuration. The two phase lock loop types described are used throughout the synthesizer section. The 1st lo and part of the 2nd lo utilize the prescaler configuration while the 3rd lo and another part of the 2nd lo use a fixed divide-by-N ratio. The bfo uses the basic phase lock loop configuration, utilizing the divide-by-N technique ($F_{vco} = N \times F_{ref}$). Common to all the synthesizers in this receiver is the phase detector used. It will be described in detail below.

i. Phase Detector. The phase detector used in all of the synthesizers is actually a phase and frequency detector. The integrated circuit also includes a charge pump and an amplifier. Each of these three sections will be discussed. Table 3-4 provides some information about the phase detectors in these synthesizers. Refer to the 1st and 3rd lo schematic diagram, (figure FO-16, sheets 1 and 2) for illustration of typical phase detector operation.

j. Reference Frequency. The phase detector normally receives a fixed reference frequency at one input (R) and a variable frequency at the input (V) from the divider section. The output responds only to transitions from the two inputs and has four output states as shown in figure 3-12. If the frequency and phase match exactly, outputs U and D remain high. If the variable input leads in phase with respect to the reference input, U remains high and D goes low. If the variable input lags in phase with respect to the reference input, D remains high and U goes low. When inputs V and R are separated by a frequency difference, the output at pins U or D varies high and low at a rate proportional to the difference frequency of the two inputs.

Table 3-4. Receiver Phase-Lock Loop Characteristics

Synthesizer	Phase detector		Programmable divider?	Vco range	Output frequency
	ref des	ref freq			
1st lo	U5	40 kHz	Yes	171.64-291.60 MHz	42.91-72.90 MHz
32M	U1A, B	1 MHz	No	32 MHz	
2nd lo prog	U12A, B	10 kHz	Yes	20-210 MHz	
out	U6A, B	200-210 kHz	No	32.20-32.21 MHz	32.20-32.21 MHz
3rd lo	U22A, B	5 kHz	No	11.155 MHz	11.155 MHz
Bfo	U9A, B	1 kHz	Yes	446.1-463.9 kHz	446.1-463.9 kHz

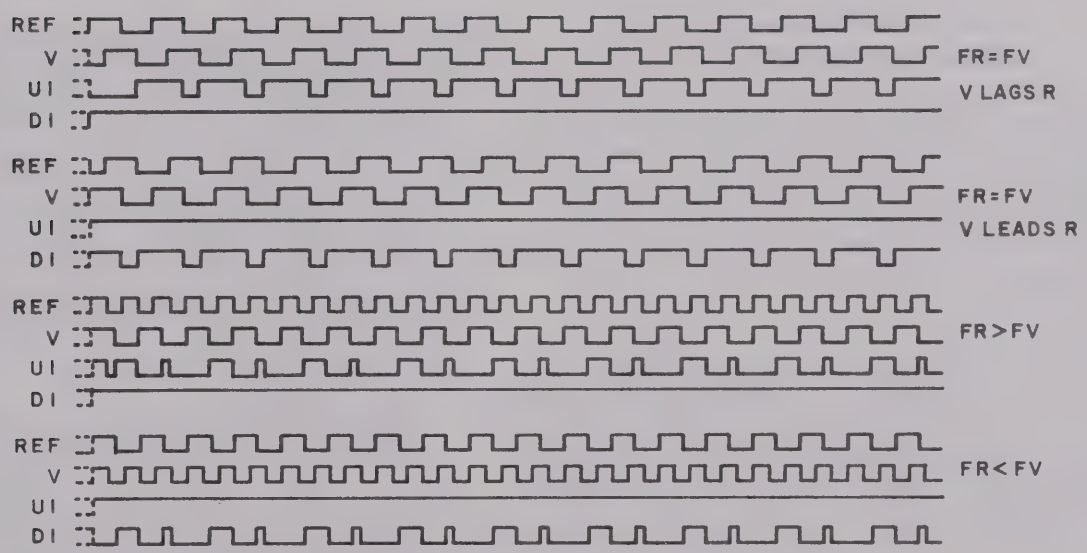


Figure 3-12. Phase Detector Timing Diagram

k. Output Pulse Waveforms. Under lock conditions, when the input of both V and R are identical in phase and frequency, the output pulses from U and D will be extremely narrow and appear on an oscilloscope as spikes. For a large difference between the two input frequencies, as when a new lo frequency is established, the outputs respond as described above with wide pulses appearing on the proper outputs.

l. Charge Pump. The charge pump accepts both outputs from the phase detector and translates the voltage levels before they are applied to the loop filter. The input to pin 11 (U22B, figure FO-16, sheet 2) appears as an inverted output at pin 10. The input to pin 4 appears as an output at pin 5. There will be a pulsed waveform entering either pin 4 or pin 11 at any given time. The charge pump delivers voltage commands from 2.25 V on positive swings to 0.75 V on negative swings, with a mean value of 1.5 V. The charge pump outputs are applied to a low-pass active filter.

m. Filter Operation. The active filter normally uses the amplifier contained in the phase detector ic plus external resistors and capacitors. In some cases an external transistor will also be used, or an external op amp. This filter has a direct influence on loop bandwidth, capture range, and transient response. Its output is the vco tuning voltage, which is applied to control the capacitance of a varicap tuning diode in the vco tank circuit, thereby controlling the vco frequency.

SECTION III. CIRCUIT LEVEL

3-15. INTRODUCTION. This section describes the electronic circuits found in the receiver, identifies all significant components, and discusses appropriate schematic diagrams. Complex units are afforded in-depth coverage with supplementary schematic and block diagrams and other figures and tables as may be necessary.

3-16. RF FILTER (A2). The schematic diagram for this circuit is shown in figure FO-2. The unit is a 10-pole, elliptic-function, low-pass rf filter, with an insertion loss of less than 1.5 dB over the normal 0.005 to 30 MHz input range. Above 30 MHz, the attenuation increases rapidly. This attenuation improves the image rejection and reduces the conducted lo leakage of the receiver. Over the range of lo and image frequencies, the attenuation of the input filter exceeds 80 dB. Resistor R1 provides a dc path to ground to bleed off any accumulated static charge at the rf input. Diodes CR1 and CR2 use the zener breakdown potential to protect the rest of the receiver from input signals in excess of +15 dBm. The nominal input impedance of the filter is 50 ohms.

3-17. INPUT CONVERTER (A3). The schematic diagram of the input converter is shown in figure FO-3. All signals entering the input converter from the rf filter are converted up in frequency and filtered. Signals passed by the 1st if. filter are amplified and down converted in frequency to 10.7 MHz. They are then further amplified and filtered. The overall net gain of the input converter is roughly +12 dB when zero gain control current is applied.

a. First Mixer (A3A1U1). Signals reaching the 1st mixer, A1U1, may be any frequency from 5 kHz up to slightly above 30 MHz and any level from the noise floor to +30 dBm. In general, many signals will be present covering a wide range of levels. The role of the 1st mixer is to handle these in such a way that the balance of the receiver can select the desired signal and reject all others. To accomplish this, a high level mixer is used and relatively high (+20 dBm) local oscillator power is applied. The conversion loss of the 1st Mixer is approximately 6 dB. Therefore, the 1st mixer is followed by an amplifier to restore the

signals to their original levels. This amplifier uses a grounded gate FET, A1Q2, to obtain a low noise figure, a good terminating impedance for the mixer, and a large signal handling ability. To set the operating point of A1Q2, a constant current source, A1Q1 and its associated circuitry, is used. Due to the variation between FETs, the effects of temperature, and other conditions of the circuit, the dc voltage at the collector of A1Q1 and the source of A1Q2 may range from about 0.5 V to greater than 3 V.

b. First If. Filter (A3A1FL1). The output load for A1Q2 is transformer A1T1 which is broadly tuned by A1C3 to ensure a proper driving impedance for the 1st if. crystal filter A1FL1. This filter requires a 50-ohm source and load and has a center frequency of 42.905 MHz and a 3 dB bandwidth of 28 kHz. The primary function of A1FL1 is to reject unwanted signals which are passed by the rf filter and 1st mixer and to establish the initial if. bandpass.

c. Second Amplifier (A3A2Q2). Signals passed by A1FL1 are coupled to a second amplifier, A2Q2, through a coupling network consisting of L1 and A2C1. This amplifier is very similar to A1Q2 and has a similar constant current source biasing it. Its output circuit is also a broadly tuned transformer, but is shunted by gain control pin diode A2CR2. As the current through the diode increases, its rf impedance decreases and the net gain of A2Q2 is decreased. Current to A2CR2 is supplied by the rf gain portion of the agc, A4A6. As the current varies from zero to maximum, there is approximately 30 dB of gain reduction.

d. Second Mixer (A2U1). The output signal of A2Q2 is down converted by the 2nd mixer, A2U1. The 2nd lo signal enters the input converter via A2J1 at a level of approximately 0 dBm. Common emitter amplifiers, A2Q5 and A2Q6, provide enough gain to bring the 2nd lo signal to a nominal level of +17 dBm. Each of these stages is broadly tuned transformer-coupled and each has some unbypassed emitter resistance to preserve a relatively low harmonic content in the 2nd lo signal.

e. Amplifier and Output. The 2nd mixer is followed by a bipolar cascode amplifier. It consists of common emitter stage A2Q4 and common base stage A2Q3. These provide relatively high gain with good stability and low noise contribution. Transformer A2T2 couples the output of A2Q3 to crystal filter A2FL1. This filter has a center frequency of 10.7 MHz, a bandwidth of 16 kHz, and requires 50-ohm terminations.

f. Oscillator Control. The received signal frequency which corresponds to the center of the 2nd if. at exactly 10.7 MHz depends on the frequencies of both the 1st and 2nd lo. The control of these two oscillators is described in the synthesizer section, paragraph 3-14.

3-18. IF. MOTHERBOARD (A4). The schematic diagram for this unit is found on sheet 2 of 5 of the main chassis schematic, figure FO-1. The if. motherboard has eleven positions for plug-in circuit cards. In the current receiver configuration, 10 positions are used and the eleventh is a spare.

a. 10.7 MHz Filter Switch (A4A1). The schematic diagram for this circuit board is shown in figure FO-4. The 10.7 MHz filter switch receives the 10.7 MHz if. signal output from the input converter, A3. At this point, the if. bandwidth has been set at 16 kHz by a filter in the input converter. The 10.7 MHz filter switch contains filters of 6 kHz and 3.2 kHz bandwidth. The purpose of this circuit is to route the if. signal through one of these filters, or through a wideband path which allows the full 16 kHz bandwidth to pass. The selection of the filter path is made by application of a logic high level to one of the three control terminals.

b. Amplifier Control. In any if. bandwidth, a logic high is applied to one of three control lines from the i/o motherboard at pin 19, 17, or 15. These lines are connected to the non-inverting inputs of U1A, U1B, and U2A. The inverting inputs are held at approximately 0.8 V by voltage divider R52-R53. The output voltage of the

selected op-amp swings positive, turning on one pair of common-emitter if. amplifier stages. For example, if U1A is selected, Q1 and Q4 are turned on.

c. Bandwidth Selection. The 10.7 MHz if. signal is input at pin 13 and coupled through C1 to the base circuits of Q1, Q2, and Q3. If Q1 is on, the signal is amplified and coupled to FL1. This filter has a 50-ohm input impedance and a 3 dB bandwidth of 3.2 kHz. The filtered if. signal is applied to amplifier Q4 through level-adjust potentiometer R26. The amplified if. signal is output at pin 57. If 6 kHz bandwidth is selected, the if. signal is routed through Q2, FL2, and Q5. If any other bandwidth is selected, the if. signal is routed through Q3, an attenuator composed of R22, R23, R24, and Q6. The gain of the three signal paths is equalized by R26, R28, and R30 to approximately 14 dB. The circuit has nominal input and output impedance of 50 ohms. U2B is not used and is connected in an inoperative condition.

3-19. 10.7 MHz/455 kHz CONVERTER (A4A2). The schematic diagram for this converter is shown in figure FO-5. This 3rd mixer converts signals from 10.7 MHz to 455 kHz. The 3rd lo signal is input at the fixed frequency of 11.155 MHz and a level of approximately -6 dBm, and is amplified by transistor Q1 and its associated circuitry to roughly +7 dBm before entering the mixer. The amplifier operates as a common emitter stage with some unbypassed emitter resistance to stabilize its gain and reduce distortion. The pi-network, C7, L2, and C8, serves as an impedance transformer and low-pass filter, further reducing distortion of the lo signal. Low-pass filter C9, L3, C10, L4, and C11 removes undesired components above 500 kHz from the mixer output and matches impedances between the mixer and the following circuits.

3-20. SIDEBAND SPECTRAL REVERSAL. The sideband structure of the 455 kHz signal is a replica of those which entered the receiver at the RF IN connector. This is not true of the 1st and 2nd if. signals. When a mixer generates an if. frequency which is the difference between an input signal frequency and local oscillator of higher frequency than the input signal, the output has a sideband spectrum which is reversed from the input. Therefore, if a single sideband signal is received which is transmitted as upper sideband, upon reaching the 1st if. the signal would appear to be lower sideband. In the 2nd mixer, the lo is below that mixer input frequency, no additional spectral reversal occurs and the 2nd if. signal would also appear to be a lower sideband. Finally, in the 3rd mixer, another spectral reversal occurs and the signal again appears this time as an upper sideband.

3-21. 455 kHz FILTER SWITCH (A4A3). The schematic diagram for this circuit is shown in figure FO-6. The 3rd if. signal from the 10.7 MHz/455 kHz converter is applied in parallel to the 455 kHz filter switch, A4A3, the usb filter switch, A4A4, and the isb/usb filter switch A4A5.

a. Filter Selection. The 455 kHz filter switch contains three possible signal paths, two with crystal filters and one with broad bandwidth. The 455 kHz bandwidth is .3 kHz when Q1 and Q2 are activated, and 1 kHz when Q3 and Q4 are activated. When Q5 and Q6 are activated the broad bandwidth path is energized, thus allowing the overall receiver bandwidth to be controlled by the 10.7 MHz filter switch or the input converter. In the 455 kHz filter switch it is possible for all paths to be off when the usb or lsb filters are selected.

(1) The input signal connects in parallel to Q1, Q3, and Q5. When Q1 is biased on, the signal passes through Q1 and is fed through the .3 kHz crystal filter, FL1. The biasing of Q1 and Q2 is controlled by the voltage on pin 19. When this voltage is high (+5 V), the output of U1D will be +12 V to +15 V, forward biasing Q1 and Q2. When this voltage is low (0 V), the output of U1D will be -12 V to -15 V which will cause an approximate 1V reverse bias to the bases of Q1 and Q2, and thus they are turned off.

(2) When the 1 kHz bandwidth is selected, module pin 17 is high, and U1A turns on Q3 and Q4. When the 3.2 kHz, 6 kHz, or

16 kHz bandwidths are selected, module pin 15 is high and U1B turns on Q5 and Q6. When isb, lsb, or usb are selected, all three control lines to this card are low and all three signal paths are inhibited.

b. Voltage Gain. All transistors, Q1 through Q6, are operated as common emitter amplifiers with unbypassed emitter resistors to control their gain. Through any of the three signal paths there is a net voltage gain of approximately 9 dB from the input to the output of the module. U1C is not used and is connected in an inoperative condition.

3-22. USB FILTER SWITCH (A4A4). The schematic diagram for this circuit description is shown in figure FO-7. The usb filter switch is connected in parallel with the 455 kHz filter switch at both the input and the output. It functions like a single channel of the other filter switch modules previously mentioned. The usb filter passes signals between 455.25 kHz and 458.2 kHz and amplifies with a net voltage gain of approximately 9 dB. Because the passband of the filter is offset above the center of the 3rd if., this filter passes only the upper sideband information when the receiver is tuned to a signal carrier frequency. This signal path is enabled when either the usb or isb detection mode is selected. The usb or isb detection mode inhibits the operation of the 455 kHz filter switch.

3-23. DETECTION MODE SELECTION. When either the usb or isb detection mode is selected, a logic high is applied to the non-inverting input of U1A. This causes its output voltage to swing to near +15 V. The switching threshold (approximately 1.6 V) is set by R17 and R18. The positive output voltage supplies bias current to amplifiers Q1 and Q2, turning them on. The 455 kHz if. signal with 16 kHz bandwidth, is amplified by Q1 and applied to the upper sideband filter, FL1. The upper sideband is amplified by Q2 and output via pin 57. Potentiometer R23 provides gain adjustment for equalizing the usb signal level with the other filtered if. signals. Resistors R7 and R8 provide impedance matching for the filter input and output, respectively.

3-24. ISB/LSB FILTER SWITCH (A4A5). See schematic diagram, figure FO-8, for circuitry. The isb/lsb filter switch connects in parallel with the 455 kHz and has an additional output that feeds into the isb detector/audio module. The lsb filter is offset below the center of the 3rd if., passing signals between 451.8 kHz and 454.75 kHz. This corresponds to the lower sideband information of a signal whose carrier frequency equals the receiver tuned frequency.

a. Lsb Detection Mode Selection. When the lsb detection mode is selected, a logic high is applied to the non-inverting input of U1A. This causes the output voltage to swing to near +15 V. The switching threshold (approximately 2.5 V) is set by R23 and R24. Diode CR1 conducts, supplying bias current through R15 to turn on if. amplifier Q1. Output amplifier Q2 is also biased on, by current flow in R21 and R9. The 455 kHz if. signal, with 16 kHz bandwidth, is amplified by Q1 and applied to the lower sideband filter, FL1. The lower sideband is amplified by Q2 and output via pin 57.

b. Isb Detection Mode Selection. When the isb detection mode is selected, Q1 is biased on by U1B and CR2, as previously described. Output amplifier Q3 is also biased on by current flow in R26 and R27. The lower-sideband information is amplified by Q3 and output via pin 53. Notice that only one output amplifier operates in either mode. Potentiometer R32 allows gain adjustment for equalizing the filtered if. signal levels. Resistor R8 provides input impedance matching for the filter. The output impedance is matched by R9 and R27.

3-25. 455 kHz AMPLIFIER/AM. DETECTOR (A4A7). The schematic diagram for this circuit description is shown in figure FO-10. Although received signals are amplified by most of the circuits in the receiver, the majority of the amplification of weak signals takes place in the 455 kHz amplifier of A4A7. Following a two-stage gain controlled amplifier, the input signal is split to provide three outputs: the if.

sample which operates the fm/cw/ssb demodulator, the if. output for the rear panel, and the input to the am. detector. The am. detector, which operates at a relatively high level for good linearity, has its output directly coupled to the age module and the audio amplifier.

a. Bandwidth Filtering. Q1 and Q2 operate as common source amplifiers with their gains controlled by a variable voltage applied to gate 2 of each transistor. Inductor L1 broadly tunes the output of Q1 by cancelling any stray capacitance, but the network consisting of L2, C9, C10, C11, and L3 forms a double-tuned bandpass filter of approximately 35 kHz bandwidth. This filter is narrow enough to suppress any broadband noise contributed by earlier stages of the receiver, but at the same time is wide enough not to restrict the receiver bandwidth. Potentiometer R7 between the first and second amplifiers adjusts the maximum gain of the amplifiers and hence of the whole receiver.

b. Output Circuitry. Transistor Q3 serves as a buffer between the 455 kHz amplifier and its three outputs. For signals fed to the fm/cw/ssb detector (pin 13), Q3 acts as an emitter-follower stage. For the rear panel if. output, Q3 feeds the signal to Q4, which acts as a power amplifier. Transformer T1 supplies a 50-ohm if. output to the rear panel, providing a nominal 20 millivolts if. output for rf inputs greater than 3 microvolts. For the am. detector, Q3 and Q5 both act as common-emitter amplifiers to raise the if. signal to a level of several volts which will permit the detector diode, CR3, to perform linearly. Diodes CR4 and CR5 provide a dc-bias to operate the am. detector and emitter-follower (Q6) above ground to establish the proper dc level for the age circuit. The low-pass filter of L7 and C28 suppresses any residual if. signal.

3-26. AUTOMATIC GAIN CONTROL (A4A6). The automatic gain control adjusts the amplification of signals passing through the receiver. In the fast or slow age gain mode, the module adjusts receiver gain by generating appropriate control voltages. In this way, consistent amplification output can be maintained by the am. detector. In the manual gain mode, receiver amplification is determined by the setting of the rf gain potentiometer located on the front panel. The age module also supplies the voltage necessary to drive the signal strength meter.

a. Fast/Slow Age Modes. The differences in decay times of fast and slow age make them useful for different kinds of signals. In the fast age mode, the gain of the receiver adjusts about as quickly for a rise in signal strength as it does for a fall in signal strength. The time taken to respond to a rise is referred to as attack time, and the time taken for a fall is known as decay time. The response to rising signals remains fast in the slow age mode, but when the signal strength falls the change in gain occurs much more slowly. For am. and fm signals, the total power contained in the carrier and sidebands does not vary much with time at the transmitter. With these types of signals, the main purpose of the age is to compensate for atmospheric losses between transmitter and receiver. These changes may occur very slowly or as rapidly as several rises and falls per second. For signals of this sort, the characteristics of the fast age mode are desirable. However, for pulsed signals such as telegraphy (A1 emission) and for ssb voice signals (A3J emission) there are rapid fluctuations in transmitted power with recurring peaks. When this type of signal is received, it is usually desirable that the age have a sort of memory for the peaks but still be able to respond quickly if there is an abrupt increase in signal level. Hence, the fast attack and slow decay times of the slow age will usually be desired for these cases.

b. Manual Gain Mode. There will also be instances where it is desirable to fix the gain of the receiver at some value to make critical comparisons of signal strength or to eliminate signals or noise below a particular amplitude. For these cases, the manual gain mode is useful. When using this mode, it is desirable to adjust the RF GAIN control so that the signal strength meter reads at the

MAN SET line for the average signal to be monitored, to obtain the greatest latitude for signal level change.

c. Age Circuitry. In the following discussions, it may be helpful to consider the age circuit modes figure 3-13 and the age amplifier schematic diagram, figure FO-9. In the age module, pins 51 and 52, the direct coupled output of the am. detector is filtered by R5 and C3 to limit the speed of response of the fast age. In the fast age mode, Q7 is biased off, disconnecting C4, so Q1 operates simply as an emitter follower. Q7 is biased on when slow age is selected, grounding the negative end of C4. In this case Q1 can charge C4 quickly if there is a rise in input from the am. detector, but when the input falls below its peak value Q1 is turned off by the charge stored in C4. Q1 continues to be off until C4 is discharged by R3. This action gives the fast attack response and slow decay response of the slow age mode. Zener diode CR2 acts as a limiter to prevent short bursts of signal from overcharging C4 (which might cut off the amplifiers for many seconds).

(1) Operational amplifier U1A acts as a buffer between C4 and the following circuits. A general-purpose diversity age output is provided at pin 16, but is not used in this configuration. Transistor Q2 acts as a threshold detector, blocking age action for weak signals. This is desirable to allow a maximum signal-to-noise ratio to be obtained in all stages of the receiver before any gain reduction is permitted. The base of Q2 is biased to approximately +0.2 V. If the emitter of Q2 is lower than about +0.8 V, Q2 will be turned off and no age action can occur. When the output of U1A is greater than +0.8 V, Q2 conducts and a gain control voltage appears across R13. When the manual gain mode is selected, Q3 and Q6 will be turned on and will clamp the voltage on R13 to ground, and +5 V will be applied to the RF GAIN potentiometer on the front panel. Op amp U2B acts as an inverting summing amplifier for the voltage at R13 (zero in manual gain mode) and the voltage on the RF GAIN control (zero in fast or slow age modes).

(2) The output of summing amplifier U2B is buffered by op amp U1D and applied to the 455 kHz amplifier on A4A7. Zero volts from U1D allows the 455 kHz amplifier to operate at maximum gain while a negative output from U1D causes the gain of the amplifier to be reduced.

(3) A sample of the if. gain control voltage from U2B is also applied to rf age threshold detector Q5. This threshold detector causes the gain reduction to occur only in the 3rd if. amplifier, unless the signal at the rf input of the receiver and in the early stages of the receiver is great enough to ensure a good signal-to-noise ratio even in the early stages. The operation of the threshold detector is the same as that of Q2, except with polarities reversed to allow for the inversion which occurs in U2B. The base of Q5 is biased around -2.7 V so the if. gain control voltage must be more negative than -3.3 V for Q5 to conduct. When the isb detector and audio module (A4A8) is energized (isb mode only), a similar age circuit in that module supplies a corresponding sample of its if. gain control voltage to Q4. This allows the RF GAIN control to respond to either the usb component, amplified by A4A7, or the lsb component, amplified by A4A8. This combined action is necessary to protect against possible overload of the 1st and 2nd if. which are common to both usb and lsb. Q4 duplicates the operation of Q5. When the isb module is not selected, Q4 does not conduct and may be ignored.

(4) As stated in paragraph 3-17, the gain control in the 1st if. amplifier is accomplished by varying the rf impedance of a diode that shunts the load circuit of one stage. The impedance of this diode is approximately inversely proportional to the dc current through it. Therefore, to obtain a 6 dB gain reduction requires a certain current, an additional 6 dB reduction requires doubling the current and another 6 dB reduction requires four times the original current and so on. To achieve the desired relationship between am. detector output and rf gain reduction requires that the control diode current rise slowly at first, then more rapidly as the received signal strength increases further (exponentially).

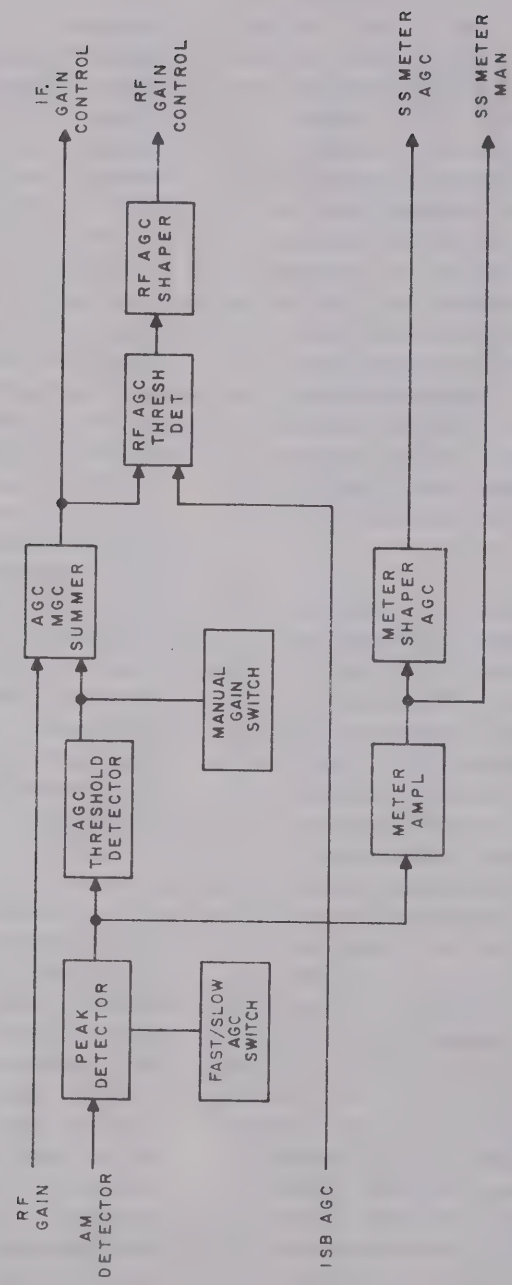


Figure 3-13. Agc Circuit Modes

This current/voltage relationship is obtained through a shaping network comprised of U2D, R47, R48, CR5, and R31. The actual current for the control diode is supplied by buffer U2A.

(5) The relationship between signal strength and the voltage out of U1A make this voltage suitable for operation of the signal strength meter. In the manual gain mode, this voltage is proportional to the rf input signal voltage. Its polarity is inverted by op amp U1C and it is applied through R49 and front panel switches A10A1S1B and S2C to the meter. This allows the receiver to act as a tuned voltmeter whose calibration depends on the setting of the RF GAIN control.

(6) In the agc modes, the voltage out of U1A increases approximately linearly with signal voltage up to the agc threshold level of 3 microvolts (rf input). Above this level the U1A output is compressed by agc action to be nearly proportional to the logarithm of the rf input voltage. By using a shaping network composed of R41, R50, R51, CR6, CR7, and CR8 to suitably compress the output of U1C at low signal levels, the signal strength meter is made to be approximately linear in dB over a greater than 100 dB range. Resistors R50 and R51 control the amount of compression and tracking of the meter scale with signal strength.

3-27. FM/CW/SSB DETECTOR (A4A9). When the fm detection mode is selected, the limiter and discriminator circuits contained in the module are energized. When either the cw, usb, lsb or isb detection modes are selected, the product detector circuits are activated as is the bfo synthesizer whose output is directed to the product detector. See figure FO-11 for the following circuit discussion.

a. Fm Mode Detection. The if. output sample of approximately 10 millivolts from the 455 kHz amplifier of A4A7 is the input signal for this module. It is applied to both demodulators although only one is actuated at a time. When fm is selected, the control input at pin 41 is high (+5 V) and Q2 and Q1 are turned on. This applies approximately +9 V to limiter U1. The input signal is amplified and clipped by cascaded stages within U1, so its output is free of any amplitude variations. The extent to which the amplitude variations are removed contributes to the am. rejection of the radio when receiving fm. The output of the limiter drives a Foster-Seeley discriminator. Diodes CR1 and CR2 rectify the composite signals fed to them by C7 and T1. When the signal from the limiter is at exactly 455 kHz, T1 is tuned so that equal and opposite voltages are produced across load resistors R6 and R7, giving a net output of zero to buffer U3A. For inputs slightly off 455 kHz, the voltages of R6 and R7 do not cancel. This causes a positive output for inputs above 455 kHz and a negative for those below 455 kHz. (Note that these polarities are reversed by U3C, so the output of the module will go negative when the signal frequency increases.) Proper adjustment of L1 will make the output voltage vary linearly with input frequency over ±8 kHz from 455 kHz. At the output of U3A, a low-pass filter, L3 and C11, reduces higher frequency noise components which are present in the discriminator output.

b. Cw Mode Detection. When the cw mode or any of the sideband modes is selected, the control input on pin 43 is high (+5 V). This turns on Q4 and Q3, applying +9 V to balanced modulator U2. The bfo is also applied to U2 (approximately a 40 millivolts level). This allows U2 to act as the 4th mixer in the signal path as described in the synthesizer relationships section. Its action may be considered to down-convert if. signals to the audio frequency range. For sideband signals, proper tuning of the receiver places the center of the if. signal at the frequency corresponding to the carrier frequency of the received signal. This causes the audio components out of U2 to reconstruct those of the original signal transmitted. For cw signals, the bfo is offset from the signal either by use of the bfo offset control on the front panel or by shifting the tuned frequency slightly. Either method causes an audible tone at the audio output when a signal is present. When the narrowest if. bandwidth is used, however, the receiver tuning may only be offset a small amount without forcing the signal out

of the passband, so the bfo offset must be used to produce a tone in the middle of the audio range where hearing is most acute.

c. Output Circuitry. The output of U2 goes through low-pass filter L2 and C17, which rejects higher frequency noise components, to buffer U3B. Op amp U3C acts as a summing amplifier for the outputs of the fm discriminator or product detector when either is present. It gives different amplifications to these two signals to bring them up to approximately equal levels. The audio output of this module goes to both the audio amplifier and the fm audio terminal on the rear of the receiver.

3-28. AUDIO AMPLIFIER (A4A10). This module receives the audio outputs of the am. and the fm/cw/ssb detectors and sends them to the rear panel located LINE AUDIO LEVEL control and to the PHONE LEVEL control located on the front panel. The line audio amplifier is driven by a signal returned from the wiper of the LINE AUDIO LEVEL potentiometer. The auxiliary phone amplifier is driven by a signal from the PHONE LEVEL control. This amplifier feeds the phone audio terminals of the rear panel audio output connector (J14). Power to operate the front panel meter is obtained from a rectifier sampling the line audio amplifier output. See schematic diagram figure FO-13 for the following circuit description.

a. Am. Audio Amplification. When the am. detection mode is selected, the control input to pin 47 is high (+5 V). The output of U1A is roughly +14 V, which reverse biases CR1. The gate of FET Q1 then assumes the same potential as its source with Q1 on, acting as a closed switch for am. audio. Both demodulators of the fm/cw/ssb detector are off so the output of U1D will be am. audio only. When any other detection mode is selected, the control input to pin 47 is low (0 V) and the output of U1A is approximately -14 V. This tends to forward bias CR1 and causes the gate of Q1 to be similarly negative, cutting off all signal flow through Q1. The audio signal from the fm/cw/ssb detector then appears at the output of U1D.

b. Line Audio Output. The signal into line audio amplifier U2 is the output of U1D attenuated by LINE AUDIO LEVEL control, on the rear panel (see sheet 2 of the main chassis schematic, figure FO-1). The two sections of U2 act as a push-pull bridge amplifier, driving output transformer T2 located on the inside of the rear panel. T2 is driven through switchable attenuator A11 (see sheet 2 of the main chassis schematic, figure FO-1). U2 is powered by the regulated +12 V (from regulator U4 in the power supply) through pin 7. This supply is filtered by C18. A circuit within U2 provides a bias voltage at pin 1 which is equal to one-half the supply voltage. This is connected to the non-inverting inputs of both amplifier sections of U2. Both amplifiers use unity feedback at dc. That is, the only dc path to the inverting inputs is from the outputs, so there is very little dc difference between their outputs at pins 2 and 13.

(1) The input signal is applied to the non-inverting input of U2B, pin 9. Although pins 6 and 9 are at the same dc potential, pin 6 is bypassed so no ac signal appears there. The operation of amplifier U2B will be clear if pin 7, the inverting input of U2A, is considered to be at ac ground. With this assumption, U2B simply appears as a non-inverting amplifier with a closed-loop ac gain of 50. Its ac gain is determined by the ratio of feedback resistors R20 and R19. On the other hand, U2A may be viewed as an inverting amplifier with an ac gain of nearly one. Its input is the full output of U2B and its gain is determined by R20 and R19 acting as input resistors and R21 as a feedback resistor. As with inverting op amps extremely little signal voltage appears at the amplifier inverting input terminal, thus satisfying the assumption made to explain the behavior of U2B. The net gain of the combined amplifier is 100 and its outputs are balanced with respect to ground. Due to the high current U2 can pass, it is grounded separately from the other circuits on the audio amplifier module to prevent ground current coupling which might lead to instability and parasitic oscillations.

(2) The output signal of U2A is rectified and filtered to indicate line audio level on the front panel meter. The rectifier is a voltage doubler consisting of CR2, CR3, C12, and C13. It responds to peak-to-peak input voltage and is calibrated by resistors R22, R23, and R24 to indicate the rms value of a sine-wave at the line audio terminals of the audio output connector on the rear panel. Its calibration is therefore most accurate for sine-wave voltages. The auxiliary phone amplifier U1B and U1C is a low power bridge amplifier and is therefore similar to U2. It operates from both +15 V and -15 V supplies and has its inputs biased at ground. Comparing its circuit with that of U2 it should be apparent that it also uses unity dc feedback and has a closed loop gain of 100 for ac signals. Its output current capability is much lower than U2, so it can only supply slightly over 100 mW compared to 1 W from U2.

3-29. ISB DETECTOR/AUDIO (A4A8). The schematic diagram for this circuit description is shown in figure FO-11. For isb operation, two independent single sideband signals must be demodulated. Since they share the same carrier frequency, they may be processed together up to a certain point. In this receiver, isb is handled as a single composite signal through the 3rd mixer. At that point it is split, the usb component being filtered and passed through the main signal path, the lsb component filtered and separately amplified and demodulated by the isb detector and audio module.

a. Isb Circuitry. The isb detector and audio module is therefore a combination of circuits from other modules previously discussed. There is a 455 kHz amplifier similar to part of A4A7, a product detector similar to that on A4A9, an age circuit like part of A4A6, and an isb line audio amplifier similar to the auxiliary phone amplifier on A4A10. A sample of the age voltage developed in this module is sent to the main age module to produce a combined rf age.

b. Age Control Voltage. Common source FET amplifiers Q1 and Q2 have variable gain depending on their gate 2 voltage. This voltage is derived from the module's age section. Potentiometer R8 is used to set the maximum gain of the amplifier to give the same input level to balanced modulator U1 as is received by A4A9U2 at low signal levels.

c. Modulation. Balanced modulator U1 uses the bfo to act as a 4th mixer and converts the lsb signal to audio. When the isb mode is selected, +5 V is applied to pin 49 and U2A switches on, supplying power to U1. Its output is low-pass filtered and then amplified by U3A. The output of U3A splits three ways. It leaves the module to go to the front panel which provides lsb phone audio in the isb mode. It also feeds the isb line audio amplifier through level control R36, and drives the age circuit.

d. Age Circuitry. The age is a simplified form of the one on A4A6. It always acts in the slow age mode. Peak detector Q4 charges C19, which discharges through R52. Buffer U2D drives age threshold detector Q3. The output of Q3 is amplified by U3D to supply the if. age to amplifiers Q1 and Q2 via buffer U3C, and the sample to the rf age circuit on A4A6. When the isb mode is selected, Q5 is turned off by the positive output from U2B. No meter outputs are supplied by this module. If the voltage from U2B makes the emitter of Q5 .6 volts more positive than the base, Q5 is turned off. When the emitter becomes .6 volts more negative than the base, Q5 is turned on.

e. Isb Line Audio Amplifier. The isb line audio amplifier (U2B and U2C) is identical, except for component values, to the auxiliary phone amplifier on A4A10.

3-30. 16-OHM SWITCHABLE ATTENUATOR (A11). The schematic diagram for this circuit is figure FO-21. When attenuator switch S1 is closed, the attenuating network formed by R1 through R6 provides a 16-ohm impedance and 30 dB attenuation to audio transformer T2. T2 transforms the 16-ohm impedance to 600 ohms for the line audio output. The attenuator card is placed in the circuit between the line audio output lines of audio

amplifier A4A10 and the audio output transformer T2. See sheet 2 of the main chassis schematic, figure FO-1. The secondary coils of T2 connect to pins 3, 4, and 5 of the rear panel audio connector, J14. If S1 is open, the attenuator has no effect on the line audio.

3-31. 600-OHM SWITCHABLE ATTENUATOR (A12). The schematic diagram for this circuit is figure FO-21. This attenuator is similar to the A11 attenuator except for resistor values. With attenuator switch S1 closed, the attenuating network formed by R1 through R6 provides a 600-ohm impedance and 20 dB attenuation to the isb audio output. The attenuator is placed in the circuit between the isb audio output lines from isb detector/audio A4A8, and pins 7, and 9 of the rear panel audios output connector. See sheet 2 of the main chassis schematic, figure FO-1. If S1 is open, the attenuator has no effect on the isb audio level.

3-32. SYNTHESIZER SECTION RELATIONSHIPS. Figure 3-6 shows the relationship of the synthesizers to receiver signal processing. It is the task of the three lo synthesizers to convert all rf input signals to 455 kHz. A brief discussion of the synthesizer relationships may be found in section II, paragraph 3-2. The following paragraphs explain synthesizer operations in much greater detail.

a. Frequency Translation. Table 3-5 provides three examples of frequency translation from the rf input to the output of the 3rd mixer. This translation begins with an rf input signal of 00.00000 MHz (column A) and ends with a signal centered at 455 kHz. Columns B and C are tabulated for input frequencies of 00.00500 and 00.01999 MHz, respectively. In column C, notice that the 1st lo has stepped up to its second increment (42.92 MHz).

b. Conversion to 10.7 MHz. The 2nd mixer translates the signals in the 1st if. range to the 2nd if. frequency of 10.7 MHz. The 9.99 kHz range of the 2nd lo works with the increment sizes of the 1st lo to provide a translation of all 1st if. signals to 10.7 MHz. The corresponding 2nd lo frequencies are shown in table 3-5 along with

Table 3-5. 1st and 2nd Lo Tuning Increments

	RF input	A (0.00000 MHz)	B (0.00500 MHz)	C (0.01999 MHz)
1st mixer	1st lo	42.91000	42.91000	42.92000
	Rf input	-00.00000	-00.00500	-00.01999
	1st if.	42.91000	42.90500	42.90001
2nd mixer	1st if.	42.91000	42.90500	42.90001
	2nd lo	-32.21000	-32.20500	-32.20001
	2nd if.	10.70000	10.70000	10.70000
3rd mixer	3rd lo	11.15500	11.15500	11.15500
	2nd if.	-10.70000	-10.70000	-10.70000
	3rd if.	0.45500	0.45500	0.45500
4th mixer (cw,ssb)	3rd if.	455 kHz		
	bfo	-455 kHz ±8.9 kHz		
	audio	±8.9 kHz		

NOTE: When am. or fm detection mode is selected, the final conversion is performed by the am. or fm detector respectively.

Table 3-6. 1st and 2nd Lo Frequencies Versus Tuned Frequency

NOTE

The following are examples of how to obtain 1st and 2nd lo frequencies for any tuned frequency. (Example frequency is 15.75635 MHz.)

To obtain 1st lo frequency use 4 most significant digits from readout	To obtain 2nd lo frequency use 3 least significant digits from readout
15.75000	00.00635
Add 42.91 to these digits	Subtract them from 32.21000
Add 15.75 42.91 58.66 = frequency 1st lo	Subtract 32.21000 .00635 32.20365 = frequency 2nd lo

the resultant 2nd if. of 10.7 MHz. To determine the 1st lo and 2nd lo frequencies corresponding to a received rf frequency, refer to the examples in table 3-6.

c. Conversion to 455 kHz. The 3rd mixer converts the 10.7 MHz 2nd if. to 455 kHz. A fixed 3rd lo frequency of 11.15500 MHz provides the necessary difference frequency for this conversion. Demodulation of the 3rd if. takes place either in the 4th Mixer (product detector) or in the am. or fm demodulation stages of the receiver.

d. Bfo Offset from 455 kHz. In cw detection mode, the product detector combines the 455 kHz signal from the 3rd mixer with the 455 ±8.9 kHz variable bfo signal. The resultant signal is an audible tone for monitoring. For single sideband demodulation, the bfo signal is fixed at 455 kHz, and is mixed with the filtered 3rd if. sideband to produce an audio signal.

3-33. TIME BASE CIRCUITS (A5A1A2). The time base circuits are part of the 1st and 3rd synthesizer/timebase (A5A1A2) module. The time base circuits have two sources of reference from which to choose. As shown in the digital time base ic diagram, figure 3-14, it can be controlled internally with a 2 MHz temperature compensated crystal oscillator (tcxo) and divide-by-2 frequency divider, or with a 1 MHz external source. The 1 MHz reference is divided down to 50 kHz, 40 kHz, 10 kHz, and 1 kHz. Buffer amplifiers Q6 and Q7 are used for isolation purposes. Synthesizers that need certain reference frequencies are listed below each frequency in figure 3-14. Refer to the schematic diagram in figure FO-15, sheet 2. S2 in figure 3-14 represents the function of U23.

a. Time Base Circuit Function. An internal source of reference is provided by a 2 MHz tcxo, while an external source of reference must be a 1 MHz signal of approximately 50 millivolts. Tri-state buffers accomplish the switching of internal and external reference sources. A truth table of the tri-state buffers used is given in figure 3-15. Getting information from input A to output Y depends upon the state of input

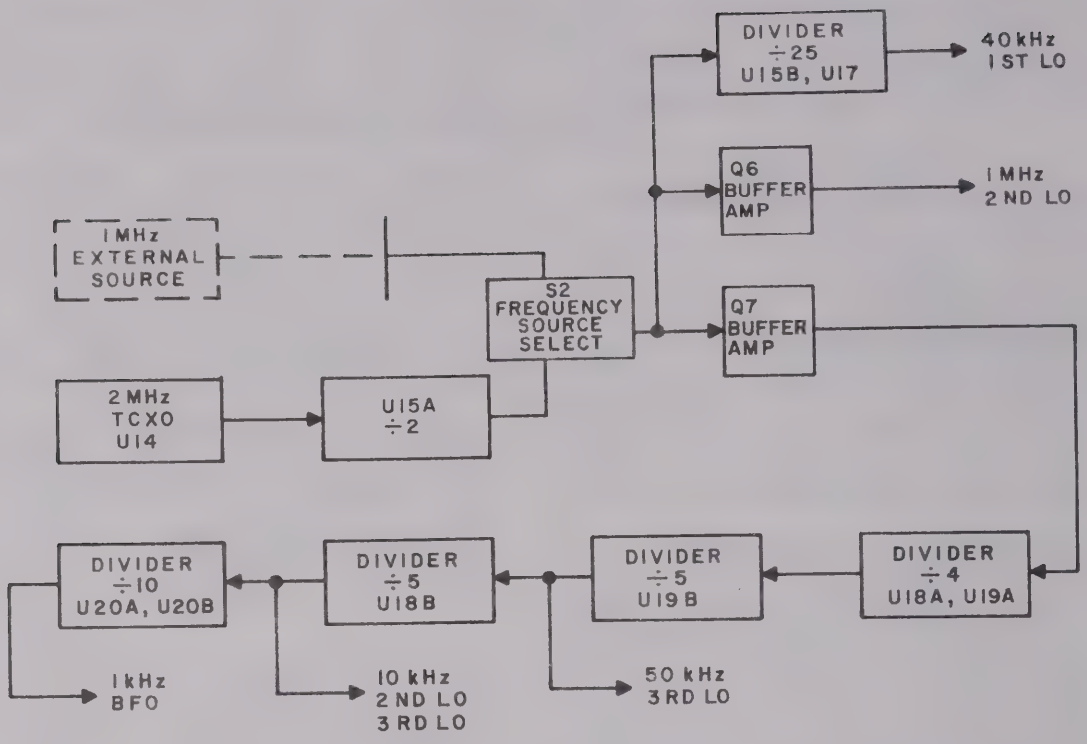
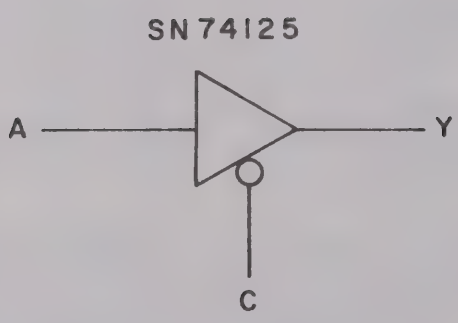


Figure 3-14. Digital Time Base Ic Diagram



U23A
U23B
U23C

TRUTH TABLE

INPUTS		OUTPUTS
A	C	Y
H	L	H
L	L	L
X	H	HI-Z

Figure 3-15. Tri-State Buffers

C. Information passes from input A to output Y when the state of input C is low. Similarly, information is inhibited from the output when the state of input C is high.

(1) External reference frequency. When operating with an external source of reference, the external select (EXT) line is grounded, the internal select (INT) is pulled high by R84, and the externally supplied 1 MHz reference is seen at module pin A17, EXT/INT STD. The internal 1 MHz reference is inhibited when it reaches tri-state buffer U23B. Therefore, the only source for the 1 MHz signal to transformer T1 is the external one. T1 and C23 resonate at 1 MHz while the voltage divider of R34 and R35 shifts the 1 MHz signal to a 2.5 Vdc level. This signal enters U16 which converts the sine wave to TTL levels. The output of U16 passes through tri-state buffer U23A and on to the rest of the time base circuits.

(2) Internal reference frequency. Operation with the internal source grounds the internal select line and allows the external select line to be pulled up by R85. Tri-state buffer U23 allows the 2 MHz signal that is divided to 1 MHz to be passed on to the rest of the circuitry. The 1 MHz reference splits to two parts of the circuit. In one direction, the reference signal passes through U23C and out the EXT/INT STD connection. The signal continues to pass through U16 but is inhibited at U23A. In the other direction, the reference signal passes to pin 3 of U23A (EXT) or pin 11 of U23B (INT), and on to the rest of the time base circuitry.

(3) 40 kHz and 1 MHz reference frequencies. For either source of reference, a 1 MHz TTL signal is present at the input of Q6 and U15B. This signal is divided by 25, through U15B and U17, to become a 40 kHz reference for the 1st lo. The 1 MHz signal also passes through an isolation amplifier Q6 to board pin A9 to be used as a reference for the 2nd lo. The 1 MHz signal also passes through another isolation amplifier, Q7, to be divided down to three more reference frequencies.

b. Frequency Divider Networks. U18A and U19A form a divide-by-4 network whose input is 1 MHz and whose output is 250 kHz. This 250 kHz divides down to 50 kHz through divider U19B and is sent to U21B, the digital mixer of the 3rd lo. The output of U19B also enters U18B, whose output is a 10 kHz signal. This signal leaves the board to be used as a reference for the 2nd lo, and is divided to 5 kHz by U21A to act as a reference for the 3rd lo circuit. The 10 kHz signal also passes through a divide-by-10 network, consisting of U20A and U20B, for an output reference signal of 1 kHz.

c. 3rd Lo Synthesizer (A5A1A2). The 3rd lo is part of the 1st and 3rd lo/time base board. The 3rd lo has an input of two reference frequencies from the time base and a fixed output frequency of 11.155 MHz. The 3rd lo utilizes a basic phase lock loop configuration and a digital mixing technique. A functional description along with a circuit description is provided below.

(1) 3rd lo synthesizer function. Figure 3-16 shows a digital ic diagram of the 3rd lo. Included in the diagram are reference designations that correspond to the 3rd lo schematic. The 3rd lo is part of the 1st and 3rd lo/time base schematic diagram, figure FO-16, sheets 1 and 2.

(2) Voltage-controlled oscillator. The voltage controlled oscillator (vco) for this synthesizer is formed by Q8, Y1, CR7, and their associated components. The oscillator is crystal-controlled to 11.155 MHz, and will be driven into proper phase relationship by the dc tuning voltage applied to CR7. The oscillator signal is buffered by emitter-follower Q9 and is split into two signal paths. One path is to board pin A55, the 3rd lo output. The other path is to flip-flop U21B. The flip-flop acts as a digital mixer, producing an output frequency equal to the difference between the vco frequency (11.155 MHz) and the frequency that is the nearest integral multiple of the clock frequency (223 x 50 kHz = 11.15 MHz). The difference equals 5 kHz. This signal is applied to phase detector U22A along with a

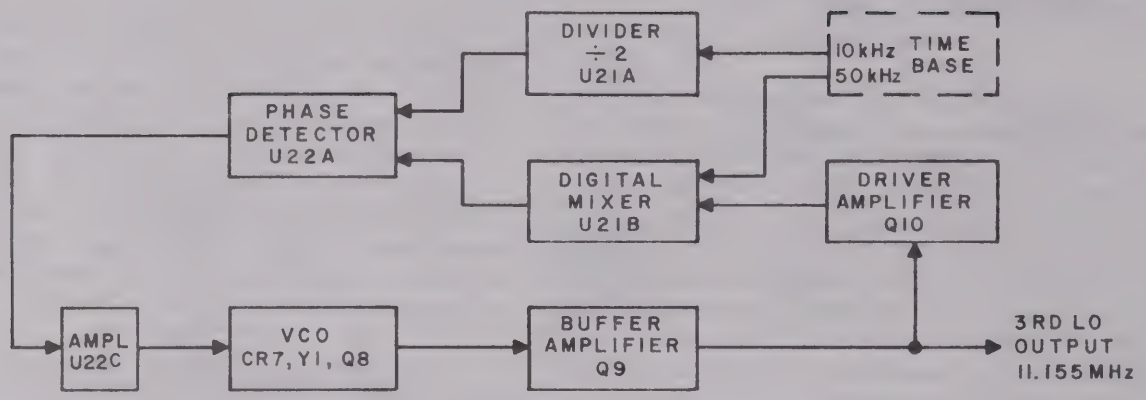


Figure 3-16. 3rd Lo Digital Ic Diagram

5 kHz reference derived from the time base circuit by U21A. The error pulses are integrated into a control voltage for the vco.

(a) The 3rd lo output, found at pin A55 of the 1st and 3rd lo synthesizer (A5A1A2), is roughly a 100 millivolts rms sine wave. This signal also couples to Q10, through C37, where it is amplified to levels applicable for the digital mixer. The 3rd lo signal is compared to a 50 kHz reference at pin 11 of U21B, to produce a 5 kHz output, when the 3rd lo is locked. This 5 kHz signal from the mixer is compared to a 5 kHz signal from the time base, via divide-by-2 U21A, in the phase detector, U22A. The charge pump U22B converts the differences in phase and/or frequency into positive and negative going dc levels. These levels pass through filter U22C and bias varactor diode CR7. The 11.155 MHz crystal oscillator is then driven in the direction to achieve lock. The 3rd lo frequency then passes through buffer amplifier Q9 and TTL driver Q10 to complete the loop.

(b) Although the vco incorporates a 11.155 MHz crystal, Y1, a phase lock loop is still needed. The purpose of the phase lock loop is to vary the oscillator frequency for the purpose of phase-locking it with the time base, and thus provide a high degree of 3rd lo frequency accuracy. With the phase lock loop disconnected, the crystal oscillator can produce a usable output frequency for the 3rd lo but would not be exactly the correct frequency to mix with the 10.7 MHz output of the 2nd mixer.

3-34. BFO SYNTHESIZER (A5A3). The bfo synthesizer produces a 455 kHz ±8.9 kHz signal. The bfo therefore tunes from 446.1 to 463.9 kHz, in 100 Hz steps. This synthesizer utilizes the basic phase lock loop configuration shown in figure 3-8. The actual phase lock loop operates at a frequency range of 10 times the bfo output to allow for the use of a 1 kHz reference frequency.

a. Bfo Synthesizer Function. A digital ic diagram of the bfo synthesizer is shown in figure 3-17. Some reference designations are included in the diagram and correlate with the bfo schematic diagram shown,

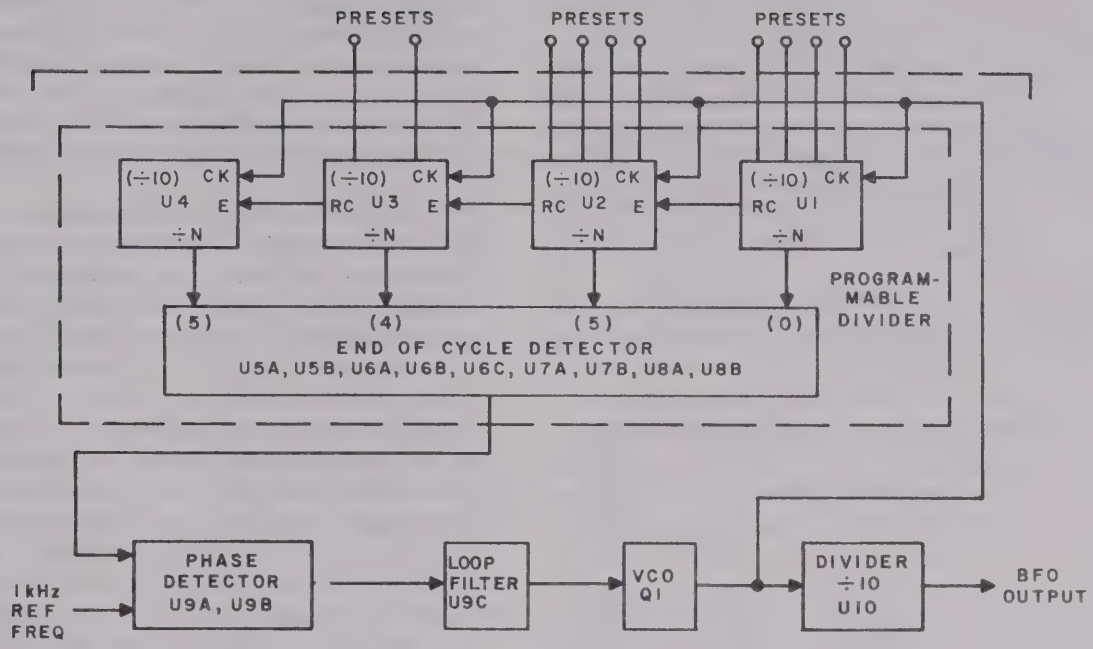


Figure 3-17. Bfo Digital Ic Diagram

figure FO-18. The digital ic diagram does not include all external connections and should only be used with this discussion.

(1) The vco produces a frequency that is distributed to the bfo output connection (via divide-by-10 counter U10) and to the programmable counter clock inputs. The presettable inputs, in conjunction with the end of cycle detector, create a divide-by-N counter. The end of cycle detector produces pulses which are compared to a 1 kHz reference frequency in the phase detector. The resultant output is pulses that characterize the difference in frequency and phase of the two input frequencies. The loop filter takes the output pulses from the phase detector and integrates them into a varying dc voltage. This varying voltage drives the vco in the proper direction to establish the desired frequency.

(2) The circuit description of the bfo synthesizer is presented in a sequential manner to facilitate understanding. The bfo phase lock loop will be discussed in the following order: programmable divider, phase detector, charge pump, loop filter, and vco. Integrated circuit data is supplied where needed.

(3) Refer to figure FO-18 to aid in the description of the counters used in the programmable divider. U1, U2, U3, and U4 are bcd synchronous up/down counters. These counters may be programmed, through inputs D, C, B and A, for any initial state, 0 through 9. The ripple clock output

and count enable input permit cascading. The ripple clock output, normally high, produces a low level pulse when the counter is at "9" when counting up, and at "0" when counting down. A high at the enable input inhibits counting while a low level input enables counting. The direction of count is determined by the level of the up/down (U/D) input. When low, the counter counts up, and when high, it counts down. The preset function is controlled by the state of the load inputs. When a logic low is applied to the load input, the bcd number at the preset inputs (D, C, B and A) is loaded into the counter, and counting will begin from that number.

(4) The programmable divider must produce an output of 1 kHz for any input signal in the range of 4.461 to 4.639 MHz. Therefore, the divide ratio of the programmable counter must be from 4461 (4.461 MHz ÷1 kHz) to 4639 (4.639 MHz ÷1 kHz). Because counters U1 through U4 are cascaded (by connecting the ripple clock of one to the enable of another) and have a maximum count of 10000 (10x10x10x10), additional circuitry is needed to reduce the divide ratio.

(5) To reduce the maximum count, an end-of-cycle detector circuit is used to terminate the count sequence. The end-of-cycle detector, consisting of U5A, U5B, U6A, U6B, U6C, U7A, and U7B, terminates the counting of U4, U3, U2, and U1 at 5450. When this number is detected, a pulse is sent to the phase detector (U9) and the counters are reset.

(6) The preset of U4 is always set (hard wired) to 0000. U3 has two preset inputs which depend on the direction of counting. The preset inputs to U3 connect to the plus or minus (±) thumbwheel switch for variable bfo selection. Selecting a negative (-) bfo frequency enters a 1001 into U3 and the counters count up. Selecting a positive (+) bfo frequency enters a 0000 into U3 and the counters count down. U2 has nine possible preset input states from bcd 0000 to 1000. U1 has ten possible preset states from 0000 to 1001. These possible preset states are determined by the setting of the bfo switch. Selecting a zero bfo offset (±0.0 kHz) grounds all preset inputs of U1 and U2, loading both counters with 0000. Also, selecting a "0" from the "+, 0, -" thumbwheel grounds all thumbwheel preset inputs causing a zero bfo offset. In all sideband modes, the bfo offset line is grounded, in turn grounding the presets of U1 and U2 and loading them with 0000. Refer to paragraph 3-51 for further clarification of the bfo switch operation.

(7) Knowing the possible input values of the divider and the end-of-cycle detection number, an example will help explain the count sequence (refer to figure FO-18). Assume that counters U4, U3, U2, and U1 are all loaded with 0000. This corresponds to a bfo frequency of 455 kHz, a vco frequency of 4.55 MHz, and a bfo thumbwheel setting of 0.0 kHz. A "+" thumbwheel setting initiates down counting. Therefore, counting from 0000 down to 5450 results in a divide ratio of 4550. (Note that the next count down from 0000 is 9999). With a divide ratio of 4550, the counters will reach a terminal count 1000 times a second with an input frequency of 4.55 MHz. Setting the thumbwheel switches to -0.0 kHz indicates the same vco frequency, 4.55 MHz, but initiates "up" counting. A negative "-" setting enters a 1001 (bcd 9) in U3, making the count start from 0900. With an input of 0900, counting up to 5450 results in the same divide ratio of 4550.

(8) Assume a bfo frequency of 460.4 kHz is needed. This corresponds to a thumbwheel selection of +5.4 kHz, and a vco frequency of 4.604 MHz. From the thumbwheel selection, a "+" presets U3 with a 0000, a "5" presets U2 with a 0101, and a "4" presets U1 with a 0100. Therefore, counting from 0054 down to 5450 results in a divide ratio of 4604. With a divide ratio of 4604, the counters will reach terminal count 1000 times a second with an input frequency of 4.604 MHz.

(9) U8A and U8B have two purposes: to send a pulse to the LOAD input of the counters for presetting and to extend the width of the end of cycle detector's pulse.

(10) Phase detector U9A receives a fixed 1 kHz frequency at its reference

input, pin 1, and a signal from the divider at its variable input, pin 3. These two signals produce an output that characterizes their differences in frequency and phase. Charge pump U9B receives this pulsed waveform from the phase detector outputs and translates them to fixed positive and negative-going amplitude levels (centered about 1.5 V).

(11) These levels are filtered and integrated by the loop filter, Q4 and U9C, providing the tuning voltage for the vco. A more complete description of the phase detector can be found in paragraphs 3-14i through 3-14m.

b. Buffer. Buffer Q4 provides a high-input impedance for the preceeding stage. Positive and negative going pulses at the gate are developed across the source output and applied to inverting amplifier U9C. The output of U9C is coupled back to the gate of Q4, through R3 and C1, providing the integrating action. Potentiometer R1 establishes zero gate to source voltage (Vgs) to Q4.

c. Voltage-Controlled Oscillator. Emitter-coupled oscillator Q1 with its external tank circuit comprises the vco. Varactor diode CR1 receives a control voltage from the active filter and adjusts the tank circuit frequency of oscillation to establish lock. The vco operates from 4.461 to 4.639 MHz. Resistors R8, R9, and R10 form the dc bias network. Feedback capacitor C7 sustains oscillation along with tuned circuit C8 and L1. R11 and C9 form a low-pass filter for +15V isolation, and the vco output is coupled to the next stage by C10.

d. Tuned Amplifier. Q2 and its surrounding components form a tuned amplifier for the incoming vco output frequency. This vco sine-wave frequency is then coupled to a sine-wave to TTL converter, Q3. From here, the digital signal returns as the clock input of the programmable divider, and is divided by 10 in U10 and provided as the bfo output signal.

3-35. 2nd LO SYNTHESIZER (A5A2). The 2nd lo tunes from 32.20001 to 32.21000 MHz in 10 Hz steps. This synthesizer utilizes three phase lock loops to produce the 2nd lo output. The digital ic diagram of the 2nd lo is shown in figure 3-18.

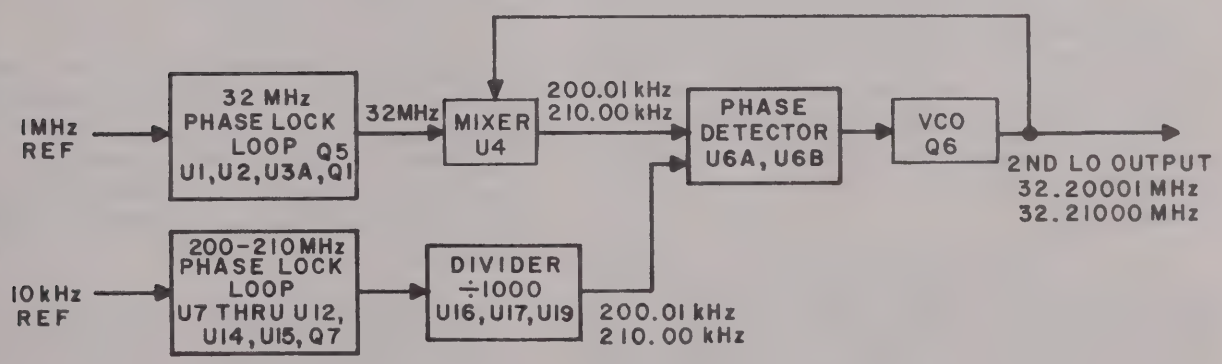


Figure 3-18. 2nd Lo Synthesizer Digital Ic Diagram

a. Phase Lock. The phase lock loop in the upper left section of the diagram has a reference input of 1 MHz from the time base and a fixed output of 32 MHz. The bottom phase lock loop is programmable and produces an output from 200 to 210 MHz. This output routes through a divide-by-1000 stage, resulting in a programmable output from 200 to 210 kHz. The third phase lock loop depends on the other two phase lock loops to produce the 2nd lo output.

b. 2nd Lo Synthesizer Function. An explanation of the 2nd lo output loop will clarify the overall operation of this synthesizer. The 2nd lo output is applied to mixer U4, where it is mixed with the fixed-frequency phase lock loop output of 32 MHz. This mixer produces the difference of its two input frequencies, resulting in an output within the 200 to 210 kHz range. This output is amplified and level translated for TTL compatibility. Mixer output and divide-by-1000 output signals are compared in frequency and phase by U6A, whose output characterizes the difference between its two inputs. Filter U6B integrates the phase detector output into a varying dc voltage which drives the vco to establish the desired frequency. The vco output is sent through a buffer amplifier whose output is the 2nd lo.

c. 2nd Lo Synthesizer Circuitry. The circuit description for the 2nd lo follows the same organization as the functional description. The 2nd lo will be discussed in the following order: 32 MHz phase lock loop, programmable phase lock loop, and 2nd lo output loop. The schematic diagram for the 2nd lo is shown in figure FO-17.

d. Phase Lock Loop Circuit. The 32 MHz phase lock loop utilizes the basic phase lock loop configuration shown in figure 3-8. The vco output (from oscillator Q5) is applied to buffer amplifier Q1. The collector output of Q1 routes through a divide-by-2 counter, U3A, and a divide-by-16 counter, U2, dividing the 32 MHz output down to 1 MHz. This signal and the 1 MHz reference from the time base are compared in phase detector U1A, and filtered by U1B; these circuits are described in paragraphs 3-24 through 3-28. The dc voltage from U1B varies the capacitance of varactor diode CR3. The oscillation frequency of Q5 depends on the tuned circuit incorporating CR3. Q1 is a buffer amplifier which has two outputs isolated from each other. C9 and L9 pass the 32 MHz emitter signal to the mixer while rejecting any harmonics of 32 MHz or any 1 MHz signals from the input of U4. The collector output is returned to the counter to close the loop.

e. Programmable Phase Lock Loop. The programmable phase lock loop incorporates a two-modulus prescaler, swallow counter, divider, phase detector, filter, and vco. The output of this loop, from Q7, feeds into U15 and U16. U14 and U15 form a prescaler whose divide ratios are 100 and 101. Figure 3-19 illustrates the prescaler operation. Individually, U15 is a divide-by-10 or 11 counter and U14 is a divide-by-10 counter. Cascading the two counters results in divide ratios of 100 and 101. U15 divides by 11 when both E5 and E4 are at a low state. This occurs only during the swallow counting sequence when E4 is held low by U11C. U15 divides by 10 for 90 input pulses from the vco. Because of this, nine input pulses enter U14 at pin 2. At this point the U14 ripple clock output, pin 15, goes low for one input pulse. This enables U15 to divide by 11 once. Therefore, dividing by 10 nine times (9x10) and dividing by 11 once (1x11) results in a divide ratio of 101 (90+11). This division of 101 occurs until the swallow counter (U7 and U8) reaches terminal count. From this point, E4 of U15 remains high until the divider reaches terminal count, thus dividing by 10. U11B and U11C detect the state of the swallow counter while U11D detects the terminal count of the divider.

f. Swallow Counter. The swallow counter is comprised of U7 (a decade counter) and U8 (a binary counter). U11A, B, and C form the swallow counter terminal count detector. The counter can be loaded with any number between 00 and 99, inclusive. During a load pulse U7 and U8 are loaded, and the output of the NAND latch formed by U11B and U11C is reset. This low signal is sent to the prescaler control input of U15,

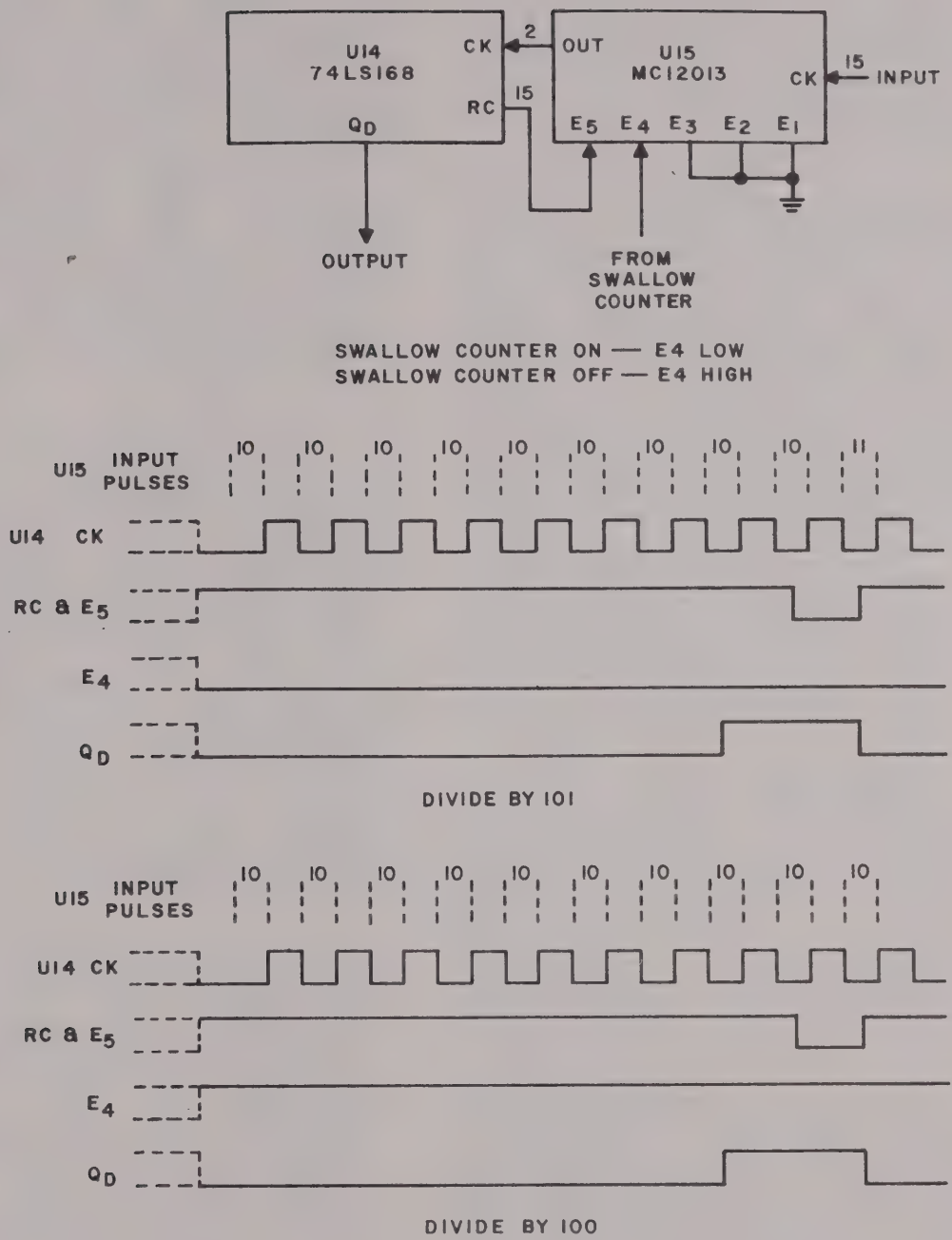


Figure 3-19. 2nd Lo Prescaler Timing Diagram

causing it to divide by 101. When U8 reaches state 1010, sensed by U11A, the NAND gate latches causing the prescaler to divide by 100. As soon as U8 is clocked to state 1010, U7 will be in 0000 state because up counting is used. Since detection occurs when U7 is 0 and U8 is 10, the terminal count for the swallow counter is 100.

g. Programmable Counter. The main programmable counter consists of binary counters U9 and U10. U11D is used as the detector. U9 can be loaded with any value between 0 and 9, and U10 is always loaded with 2. Since binary counters are used, the 2 loaded in the second digit is not worth 20 (2x10), but is worth 32 (2x16). U11D senses a high level on the QA output of U9 and the minimum/maximum output of U10. The first time this occurs while up counting is when U10 and U9 are in states 15 and 1, respectively. Again the 15 in the second digit is worth 240(15x16), so the terminal count is 240 + 1 = 241. Each count of the programmable counter is equal to 100 counts of the overall divide chain so the actual terminal count for the programmable counter is 241 x 100 = 24100.

h. Terminal Count. Combining the terminal counts of both counters yields the overall terminal count. The terminal count for the swallow counter was 100 and for the programmable counter was 24100. Therefore, the terminal count for the whole chain is 100 + 24100 = 24200. The programmable counter is always loaded with 32 plus the input to U9 so the overall chain is loaded with 3200 (32x100) plus the inputs to the three stages.

(1) Suppose 000 is loaded into the 2nd lo. The input to the counters is 3200 + 000 = 3200. The terminal count is 24200, so the divide ratio is 24200 - 3200 = 21000. Suppose 999 is loaded. The input is 3200 + 999 = 4199. The divide ratio is 24200 - 4199 = 20001. Suppose 500 is loaded. The input is 3200 + 500 = 3700. The divide ratio is 24200 - 3700 = 20500.

(2) Assuming lock is achieved, a 10 kHz signal should be seen at the output of U11D. This signal is compared to a 10 kHz reference frequency in phase detector U12A, and filtered in U12B. The dc voltage from U12B varies the capacitance of varactor CR5 which varies the frequency of oscillator Q7. This signal, ranging from 200.01 MHz to 210.00 MHz, feeds the prescaler and routes to a divide-by-1000 circuit. U16, U17, and U19 each are divide-by-10 counters. When cascaded, the circuit provides a division ratio of 1000 (10x10x10). The input to U6A is a signal ranging from 200.01 kHz to 210.00 kHz. The 2nd lo output loop produces the 2nd lo frequency range of 32.20001 to 32.2100 MHz in 10 Hz steps. This range of frequencies and the 32 MHz signal from Q1 mix in U4, resulting in a difference frequency range from 200.01 kHz to 210.00 kHz.

(3) Differential amplifier U5 accepts the push-pull output from U4 and amplifies the signal approximately 10 times into a single-ended output. Q2 translates the output level of U5 to TTL levels for the input to U6A. This signal and the phase locked frequency from the programmable divider are compared in phase detector U6A, producing dc voltages that are filtered by U6B. U6B's output varies the capacitance of varactor diode CR4 and tunes oscillator Q6. This output enters a buffer amplifier, Q3, where the signal is output to mixer U4, and is coupled through impedance matching voltage divider C22, C23, to become the 2nd lo output.

3-36. 1st LO SYNTHESIZER (A5A1A2). The 1st lo frequency synthesizer circuits are part of the 1st and 3rd lo synthesizer. The 1st lo utilizes a phase lock loop configuration with the prescaling technique shown in figure 3-10. The output of the 1st lo tunes in 10 kHz steps from 42.91 MHz to 72.90 MHz. This tuning range mixes with the 0.0 to 29.99 MHz receiver tuning range to produce a 1st if. signal in the range of 42.90 to 42.91 MHz. A digital ic diagram of the 1st lo is shown in figure 3-20. The programmable divider, phase detector, and lead-lag filter of the 1st lo Synthesizer are contained on the main circuit board, the vco and tuning voltage control circuits are mounted separately, but together with the main circuit board, they form a combined

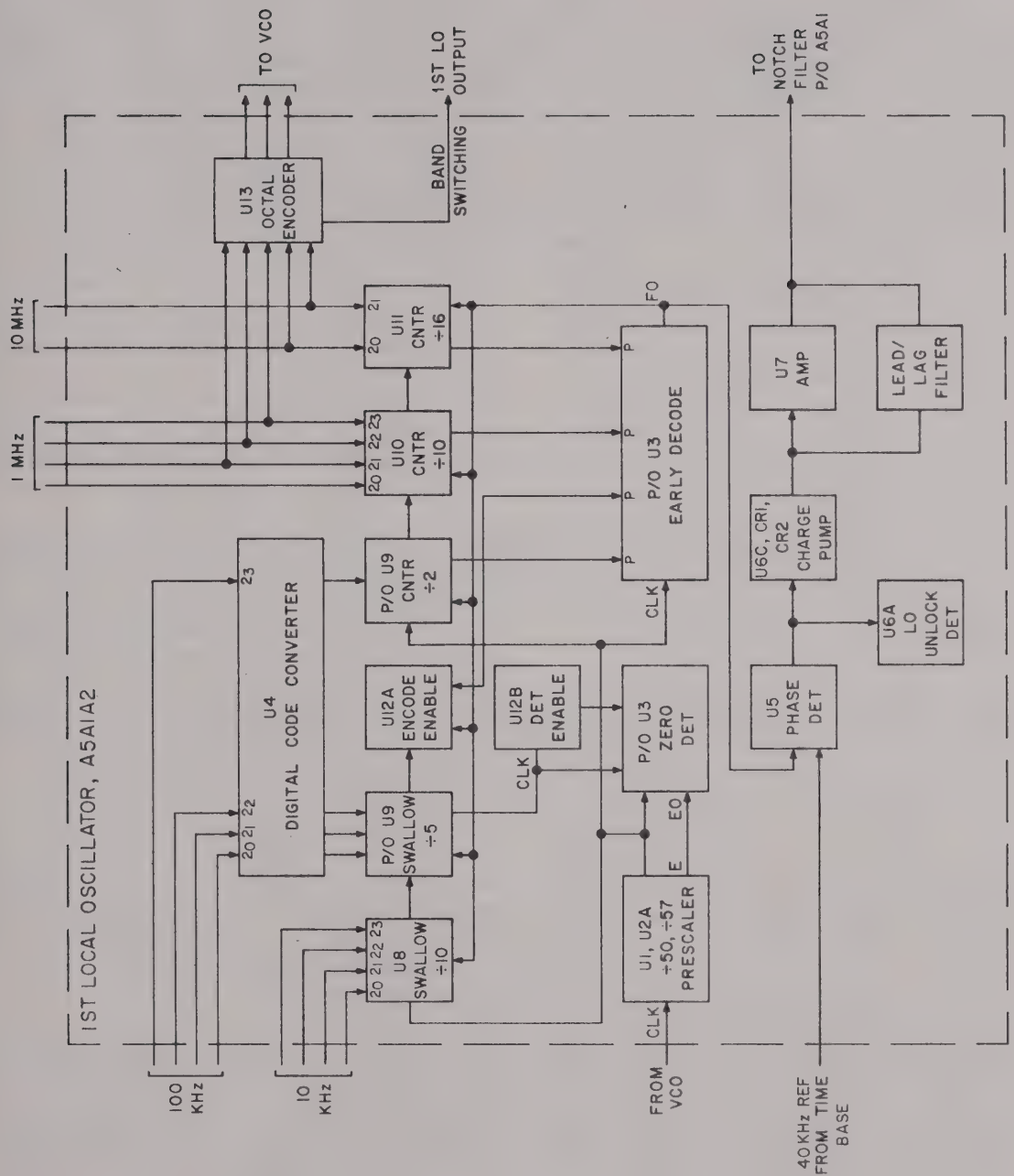


Figure 3-20. 1st Lo Synthesizer Digital Ic Diagram

assembly (refer to figures FO-14 and 7-23). The phase detector (U5), charge pump (U6C), and lead-lag filter (U7) of the 1st lo will be discussed lightly since a detailed description of these circuits was presented previously in paragraphs 3-14 through 3-14m.

a. Prescaler. A two-modulus prescaler, described in paragraphs 3-14d through 3-14f, is used at the input to the divide-by-N counter to divide down the frequency from the vco so that it can be handled by conventional low-power Schottky counters. If the 1st lo is locked on the correct frequency, the output of the programmable counter will be 40 kHz. This 40 kHz is compared to the 40 kHz reference frequency by phase detector U5. The difference in frequency and phase of these two input signals produces a series of pulses which the charge pump converts to positive or negative going voltages. These voltages are integrated by lead-lag filter U7 to provide the tuning voltage for the vco. The notch filter and tuning voltage ground reference circuits isolate the vco tuning voltage from any ripple from the 40 kHz reference frequency. An octal band-switching code, generated by octal encoder U13 from the divider section, switches the vco to one of eight tuning ranges spaced 16 MHz apart.

b. Voltage Controlled Oscillator. The vco has two inputs and two outputs. The inputs to the vco are a tuning voltage and a band-switching code. Together they supply the vco with the necessary information for tuning to the correct frequency. The actual vco generates frequencies between 171.64 MHz and 291.60 MHz. This range is sent to the programmable divider of the phase lock loop. The other output of the vco is applied to a frequency divider. Since the 1st lo frequency range is from 42.91 MHz to 72.90 MHz, the vco frequency range must be divided by four. For this same reason, the eight tuning ranges of the vco (from the band switching code) are spaced 16 MHz apart within the vco and 4 MHz apart (16 MHz ÷ 4) for the 1st lo output. In summary, the vco frequency is four times that of the 1st lo output frequency.

c. Programmable Divider. The programmable divider has an input range from 171.64 MHz to 291.60 MHz, in 40 kHz steps, and must divide each of these frequencies down to exactly 40 kHz. This condition calls for the programmable divider to have a divide ratio from 4291 (171.64 ÷ 40 kHz) to 7290 (291.60 MHz ÷ 40 kHz). From the conditions above, the counters within the programmable divider, U8, U9, U10 and U11, must have a divide range from 4291 to 7290. The inputs of the counters are always preset from the bcd equivalents of the four most significant digits of the tuned frequency. This range is from 0000 to 2999. One other condition exists at the input to the counters; U11 is wired to automatically add 8 to its preset. Therefore, the vco presets have a range from 8000 to 10999. The external logic circuits connected to the counters stop the counters from counting when they reach the terminal count number 3709. Since the counters are wired to count down, the overall divide range needed from the counters is obtained; the divide range is from 4291 (8000-3709) to 7290 (10999-3709).

3-37. COUNTING CYCLE. Although the counters have the correct divide range needed to divide the input frequency down to 40 kHz, the vco output frequency is too high for the counters to operate properly. Therefore, a high-speed, two-modulus prescaler is used to divide the input frequency to a range that can be handled by the counters. The prescaler used in the 1st lo divides either by 50 or 51. In order for the counters to divide correctly, they must divide in increments of 50 or 51 also. When the prescaler divides by either 50 or 51, only one pulse is sent to the counters. Therefore, the counters must interpret this pulse as representing either 50 input pulses or 51 input pulses.

a. Counter Section. The counter section shown in figure 3-20 is divided into two parts: a programmable counter and a swallow counter. The programmable counter consists of U11, U10, and part of U9, and the swallow counter consists of U8 and part of U9. Both counters receive the same clock pulse from the prescaler output. By having the swallow counter control the

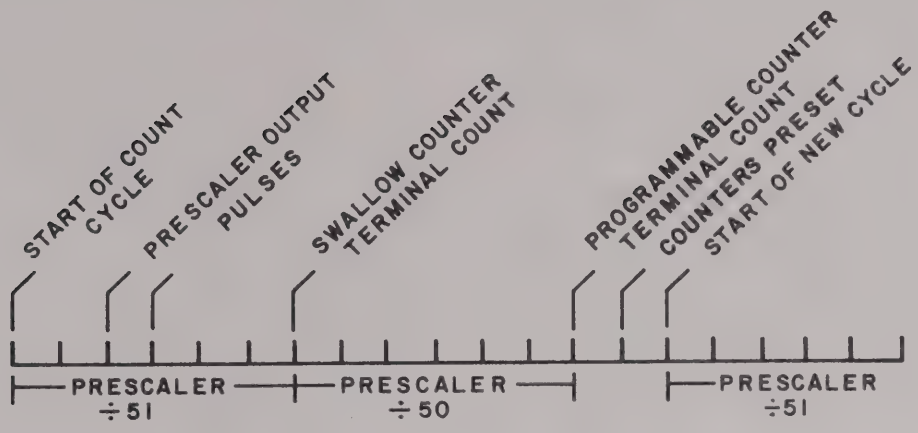


Figure 3-21. 1st Lo Synthesizer Counting Cycle

prescaler, the represented count will decrement by 51 when the programmable counter and the swallow counter are counting. When the swallow counter reaches terminal count, the prescaler will begin to divide by 50 and the swallow counter will be disabled for the remainder of the cycle.

b. 1st Lo Counting Cycle. Figure 3-21 shows graphically a typical 1st lo counting cycle. The prescaler divides by 51 until the swallow counter reaches terminal count. When the outputs of the swallow counter reach this state, they cause the zero detector's E output state to become high. This causes the prescaler to divide by 50 until the end of the count cycle. Since the programmable counter is separately clocked, it continues to count down until its terminal count is detected by the early decode circuit. When this occurs, the $\overline{F_0}$ output of the early decode goes high after the next clock pulse from the prescaler. This is the output pulse supplied to the phase detector. When the output from the early decode circuit again goes low, it resets the counters to the preset number on their inputs. It also causes the reset enable circuit to reset the zero detector circuit causing its output to go low so the prescaler can divide by 51 during the next count cycle.

3-38. PRESCALER, U1 AND U2A. The prescaler input frequency ranges from 171.64 MHz to 291.60 MHz. The prescaler divides this by 50 or 51, depending on the states of the E inputs of U1 (refer to schematic diagram, figure FO-16). Figure 3-22 illustrates the prescaler's operation. U1 is a divide-by-10/11 counter and U2A is a divide-by-five counter. The prescaler divides by 51 when E4 is low and when E5 pulses low once for every five pulses from U2A. E5 is low for only one count out of five so the complete count cycle of U1 and U2A takes 51 counts (4 x 10 + 1 x 11). This count cycle continues until the swallow counter reaches terminal count. E4 then goes high and U1 divides by 10 only, giving U1 and U2A a complete count cycle of 50.

3-39. DIGITAL CODE CONVERTER U4. U4 is a programmable read-only memory that serves as a decoder or code converter. It behaves as a look-up table to translate a bcd input, which has bit values of 2^3, 2^2, 2^1, 2^0, to a new code with bit values of 5^1, 2^2, 2^1, 2^0. Table 3-7 illustrates all possible inputs and outputs of U4. U4 serves as part of the programmable counter and part of the swallow counter. Output Y_4 presets the divide-by-2 counter, which is part of the

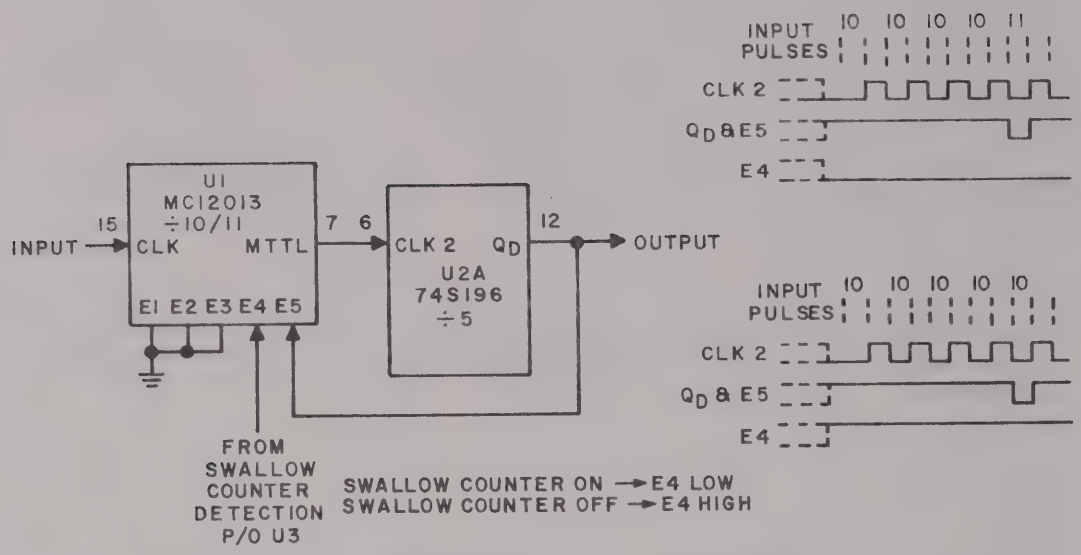


Figure 3-22. 1st Lo Synthesizer Prescaler Timing Diagram

Table 3-7. Code Converter U4, Truth Table

BCD inputs to U4				Outputs from U4			
2^3	2^2	2^1	2^0	5^1	2^2	2^1	2^0
D	C	B	A	Y_4	Y_3	Y_2	Y_1
0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	0	0	1
0	1	0	1	1	0	0	0
0	1	1	0	1	1	0	0
0	1	1	1	1	0	1	1
1	0	0	0	1	0	1	0
1	0	0	1	1	0	0	1

programmable counter. Outputs Y_1, Y_2, and Y_3 preset the divide-by-five counter which is part of the swallow counter. The function of U4 in each counter section is discussed below.

3-40. PROGRAMMABLE COUNTER U9, U10, U11. The programmable counter is formed by U11, U10, and part of U9. U11 and U10 count down and U9 counts up. U10 is a divide-by-10 counter (bcd). U11 is a divide-by-10 counter (bcd). With the D input of U11 tied high (to Vcc 3), the counter is always preset with at least 8 (1000). The divide-by-2 counter within bi-quinary counter U9 is part of the programmable counter, using preset input A and output QA. U11, U10, and U9 are cascaded with a clock input entering U9 at pin 8 (CLK1). U9 cascades to U10 and clocks U10 on its 0 to 1 transition. U10 cascades to U11. The programmable counter counts from its preset values on U11, U10, and U9 down to a detection number of 370 (0011, 0111, 0000). A carry condition is the only exception to this count sequence and will be discussed later.

3-41. SWALLOW COUNTER U8 AND U9. The 1st lo swallow counter is formed by decade counter U8 and the divide-by-5 part of bi-quinary counter U9. Cascaded, they form a divide-by-50 counter which controls the divide mode of prescaler U1. The counting mode of the swallow counter is unusual, in that U8 counts down and clocks U9, which counts up. Refer to table 3-8. The terminal count for the swallow counter occurs at 09. At this point the Z inputs of

Table 3-8. Count Sequence, 1st Lo Swallow Counter

÷5 U9B (up)	÷10 U8 (down)	Comments	÷5 U9B (up)	÷10 U8 (down)	Comments
0	0	This transition	3	4	
1	9	sets carry condition	3	3	
1	8	(U8 clocks U9)	3	2	
1	7		3	1	
1	6		3	0	
1	5		4	9	U8 clocks U9
1	4		4	8	
1	3		4	7	
1	2		4	6	
1	1		4	5	
1	0	Swallow counter	4	4	
2	9	validate (U8 clocks U9)	4	3	
2	8		4	2	
2	7		4	1	
2	6		4	0	
2	5		0	9	Terminal count
2	4		0	8	(U8 clocks U9)
2	3		0	7	
2	2		0	6	
2	1		0	5	
2	0		0	4	
3	9	U8 clocks U9	0	3	
3	8		0	2	
3	7		0	1	
3	6		0	0	Repeat cycle
3	5		1	9	U8 clocks U9

control device U3 must all be low. However, the $\overline{Z_0}$ input is controlled by U12B, which enables detection of the terminal count. The Q output of U12B is set high at the beginning of each count cycle, and will not go low until the most significant swallow counter digit, from U9, steps from 1 to 2. This clocks U12B, validates the terminal count, and the prescaler mode will be changed when the counter reaches 09. Therefore, for preset values between 29 and 40, the counter cycles past the first 09 count to the 10 to 29 transition, then terminates at 09.

a. Carry Condition U12A and U6B. A carry condition occurs in the programmable counter when the preset to the swallow counter falls into the range of 29 to 00. Refer to table 3-8. If the preset to the swallow counter is 00, the first count will cause the transition to 19. When this occurs, the U9 output Q^B will go high, while Q^C remains low. The logic of U24B and U24A produces a logic high to clock U12A. The Q output of U12A is preset high at the beginning of each cycle, but if the 00 to 19 transition occurs, it is clocked low. This applies a logic low to NAND gate U6B, and effectively shifts the actual terminal count of the programmable counter from 370 to 371. (The actual number detected is 380 or 381, see paragraph 3-42 for explanation.)

b. Count Sequence. Table 3-9 lists the count-down sequence of the 1st lo divider for two rf input frequencies. In the first example, the receiver is tuned to 00.00XXX MHz and the 1st lo counter presets are loaded with the value 8000, as explained previously. The two most significant preset digits (8 and 0) are loaded directly into U11 and U10. The least significant digit (0) is loaded directly into U8. The 0 applied to code converter U4 results in a 0 preset to both sections of U9, as explained in paragraph 3-40. The swallow counter (U8, U9B) and the programmable counter (U9A, U10 and U11) are both decremented by 1 prescaler output pulse for each 51 prescaler input pulses. When the swallow counter reaches its terminal count (at 09) the prescaler divide mode changes to ÷ 50. Since the swallow counter was preset with 00, a carry condition exists and the terminal count for the programmable counter is 371, as explained in paragraph 3-41a. When the programmable counter reaches terminal count, the cumulative number of pulses into the prescaler equals 4291. Since the loop reference frequency is 40 kHz, the vco frequency is 4291 x 40 kHz, or 171.64 MHz. The vco output to the mixer is divided by 4, resulting in an actual lo output of 42.91 MHz. This is the lo frequency corresponding to a tuned rf of 00.00XXX MHz.

c. Counting Cycle. The second entry in table 3-9 gives an example with the receiver tuned to 29.99XXX MHz and the 1st lo counter presets loaded with the value 10999. The two most significant preset digits (10 and 9) are loaded directly into U11 and U10. The least significant digit (9) is loaded directly into U8. The 9 applied to code converter U4 results in a value of 1 applied to U9A, and a value of 1 applied to U9B, as explained previously. Since the swallow counter preset is 19, no carry condition exists and the terminal count for the programmable counter is 370. When terminal count is reached, the cumulative number of pulses into the prescaler equals 7290. With a loop reference of 40 kHz, the vco frequency is 291.6 MHz, and the actual lo output (291.6 MHz ÷ 4) equals 72.90 MHz. This corresponds to a tuned rf of 29.99XXX MHz.

3-42. DIVIDER SECTION TERMINAL COUNT. The terminal counts of both the swallow counter and the programmable counter are detected by the terminal count control ic, U3, see figure FO-16. The prescaler mode is controlled by the swallow counter logic outputs applied to the Z inputs of U3, as described in paragraph 3-41. The terminal count of the programmable (main) counter is obtained when the correct logic levels are applied to the P and B inputs of U3. As previously stated, the actual terminal count occurs at 370 (or 371, with the carry condition). However, because of the relatively high counting speed, the counters require about two clock pulses to reset at the end of each counting cycle. Therefore, the divider makes use of a two-pulse "early decode" circuit contained in U3, see figure 3-23. When the terminal count

logic conditions are satisfied (at the P and B inputs) U3 counts one clock pulse, then drops the F_0 output line low. This resets the flip-flops and presets (loads) the counters. At the end of the second clock pulse, the F_0 output goes high, starting the count cycle and clocking the vco phase detector, U5. Therefore, the number detected by U3 is 380 (or 381, in the carry condition) but the actual terminal count is 370 (or 371), because two more prescaler output pulses occur before the F_0 output goes high.

3-43. VCO BAND SELECT CODE. The vco band select circuits are shown in the upper right-hand corner of sheet 1 of the 1st and 3rd lo synthesizer/timebase schematic diagram, figure FO-16. The purpose of U13, Q2, Q3, and Q4 is to translate the 1st lo frequency range into eight different bands for the vco. The band select code causes different combinations of inductance to be placed across the vco tuning circuitry, thereby changing the vco frequency range. Octal encoder U13 accepts bcd inputs from

Table 3-9. 1st Lo Divider Count-Down Cycles

Prescaler mode	Pulses into prescaler: new	Pulses into prescaler: cum.	Prescaler output pulses	U9B (÷5)	U8 (÷10)	U11 (÷16)	U10 (÷10)	U9A (÷2)	Comments
51	0	0	0	0	0	8	0	0	Preset for tuned
	51	51	1	1	9	7	9	1	freq of 00.00XXX MHz
	51	102	1	1	8	7	9	0	
	408	510	8	1	0	7	5	0	
	51	561	1	2	9	7	4	1	Swallow ctr validation
	1530	2091	30	0	9	5	9	1	Swallow ctr terminal
50	50	2141	1			5	9	0	count
	900	3041	18			5	0	0	
	1000	4041	20			4	0	0	
	100	4141	2			3	9	0	
	50	4191	1			3	8	1	Early decode
	100	4291	2			3	7	1	terminal count (carry condition)
	4291 x 40 kHz = 171.64 MHz								Divide ratio = 4291
51	0	0	0	1	9	10	9	1	Preset for tuned
	51	51	1	1	8	10	9	0	freq of 29.99XXX MHz
	408	459	8	1	0	10	5	0	
	51	510	1	2	9	10	4	1	Swallow ctr validation
	1530	2040	30	0	9	8	9	1	Swallow ctr terminal
50	1000	3040	20			7	9	1	count
	1000	4040	20			6	9	1	
	1000	5040	20			5	9	1	
	1000	6040	20			4	9	1	
	1000	7040	20			3	9	1	
	150	7190	3			3	8	0	Early decode
	100	7290	2			3	7	0	terminal count (no carry condition)
	7290 x 40 kHz = 291.60 MHz								Divide ratio = 7290

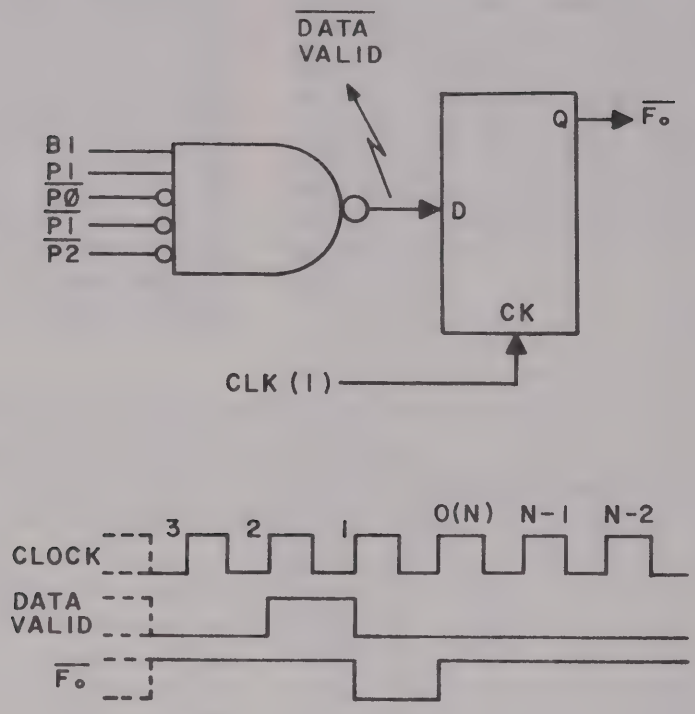


Figure 3-23. Two-Pulse Early Decode, Count Termination

the two most significant digits of the 1st lo frequency word and translates them into a binary coded word on Y_2, Y_3, and Y_4. The transistors connected to these outputs supply negative true-code outputs. For example, when Y_2 is low, -12 V appears at the base and emitter of Q2 turning the transistor off. This causes the collector to be off and +15 V to appear at output E1. When Y_2 is high, zener diode CR8 conducts causing Q2 to turn on, resulting in a -12 V potential at output E1. The relationship of the band select code to the lo frequency word is detailed in Table 3-10.

3-44. VOLTAGE CONTROLLED OSCILLATOR (A5A1A1). Figure 3-24 is the digital ic diagram for the voltage controlled oscillator. The vco is an integral part of the 1st lo synthesizer loop, whose inputs are a tuning voltage and a band select code, and whose output is the 1st lo frequency. The vco operates at a frequency four times the desired 1st lo frequency. The band select code and the tuning voltage combine to tune the oscillator from 171.64 MHz to 291.60 MHz in 40 kHz steps. The oscillator output is amplified by Q2 and split between the buffer amplifier and the divide-by-4 assembly. Buffer amplifier Q3 provides the synthesizer with a sample of the oscillator signal. The sample is processed and, if required, a correction is made to the tuning voltage. The amplified oscillator frequency is divided by 4 (by U1) since the oscillator frequency is actually four times the desired 1st lo frequency. Amplifier Q7 supplies a high-level signal for the 1st mixer. Refer to figure FO 15 for the schematic diagram of this circuit. Applying a negative-true-code voltage to the band select inputs tunes the

Table 3-10. Band Select Coding

Rf digit		Band select code (negative true)		
10 MHz (U11)	1 MHz (U10)	2^2 (E3)	2^1 (E2)	2^0 (E1)
0	0	0	0	0
0	4	0	0	1
0	8	0	1	0
1	2	0	1	1
1	6	1	0	0
2	0	1	0	1
2	4	1	1	0
2	8	1	1	1

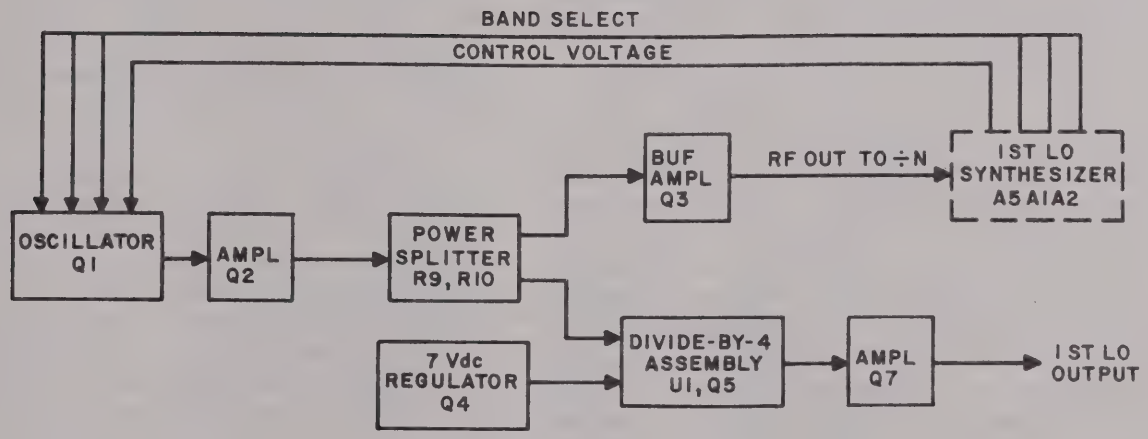


Figure 3-24. Vco Digital Ic Diagram

oscillator to one of eight different frequency bands. When the band select inputs are all positive, CR1 through CR3 are off, and L2 through L4 are effectively out of the circuit. This allows the inductance of T1 to be maximum. When any or all of the band select inputs are negative, the corresponding diode or diodes will conduct and the inductance of T1 will be reduced by the shunting effect of the inductor (L2, L3, or L4). Varactor diode CR4 fine tunes the oscillator in response to the tuning voltage input. Common-emitter amplifier Q2 keeps load changes at the input of power divider R9 and R10 from being reflected back to the output of oscillator Q1. T2 matches the output of the amplifier to the input of the power divider. The signal is coupled to buffer amplifier Q3, which drives the prescaler of the synthesizer. R9 and C15 couple the signal from Q2 to the input of the divide-by-4 circuit U1. MECL divider U1 divides the signal frequency by four and amplifier Q5 isolates its output from load changes. Voltage regulator Q4 provides U1 and Q5 with a -7.0 V power input from the -12 V power supply input to the assembly. Amplifiers Q5 and Q7 provide the relatively high levels needed to drive the input of the 1st mixer of the input converter.

3-45. 1st and 3rd LO SYNTHESIZER (A5A1). This assembly connects the 1st and 3rd lo/timebase board to the 1st lo vco. The connections include three lines for the vco band select code, two lines for the vco tuning voltage, and one line connecting the vco output to the 1st lo divider section. Also on this board is a -12 Vdc regulator that supplies voltage to both the 1st lo synthesizer and the 1st lo vco. The schematic diagram corresponding to this module is shown in figure FO-14. The tuning voltage connects to the vco through a 40 kHz trap (C1, C3, L1, L2, and L3) and a low-pass filter (C4, C6, C8, R4, and L4). CR1, CR2, and CR3 provide a 1.8 V potential on the tuning voltage reference line. A -15 Vdc potential from the 1st and 3rd lo/timebase circuit board enters pin 3 of the voltage regulator VR1 and is regulated to a -12 Vdc output on pin 2. The -12 Vdc is supplied to the vco, to power its circuits, and to the 1st and 3rd lo/timebase board, to power lead-lag filter U7 and the band switching circuit.

3-46. SYNTHESIZER MOTHERBOARD. The 1st and 3rd lo synthesizer (A5A1), 2nd lo synthesizer (A5A2) and bfo synthesizer (A5A3) assemblies plug into the synthesizer motherboard A5. The schematic diagram of this board is shown on sheet 5 of the main chassis schematic, figure FO-1.

3-47. CONTROL SECTION. The control section is made up of seven separate modules which, together, control the functioning of the receiver by means of the front panel controls. Figure 3-1, located in section I of this chapter, shows the working relationships of these seven units. Each will be discussed in paragraphs 3-47a through 3-47k(2).

a. Motherboard A6 And Front Panel. The manual tuning up/down counter and the front panel interconnect (A6A2) modules plug into the A6 motherboard, as shown on sheet 4 of the main chassis schematic, figure FO-1. The manual tuning (A7) and frequency display (A8) modules and the bfo offset switch (A9) and upper panel (A10A1) and lower panel (A10A2) control boards mount on the front panel. The schematic diagram for these units is shown on sheet 4 of the main chassis schematic, figure FO-1.

b. Manual Tuning Up/Down Counter (A6A1). The data that constitutes the rf frequency is present in the up/down counter and it is sent to the 1st and 2nd lo synthesizers and is encoded for use by the frequency display board. The manual tuning module is the means by which frequency information is changed in the receiver. Refer to manual tuning up/down counter digital diagram, figure 3-25 and manual tuning up/down counter schematic diagram, figure FO-19.

c. Presettable Up/Down Counter. Integrated circuit 14510 is a presettable up/down decade counter and is shown in figure 3-26. Pin 15 is the clock input. The counter will increment for each rising edge of the clock when the up/down input (pin 10) is high; when pin 10 is low, the counter will decrement. If the parallel enable input

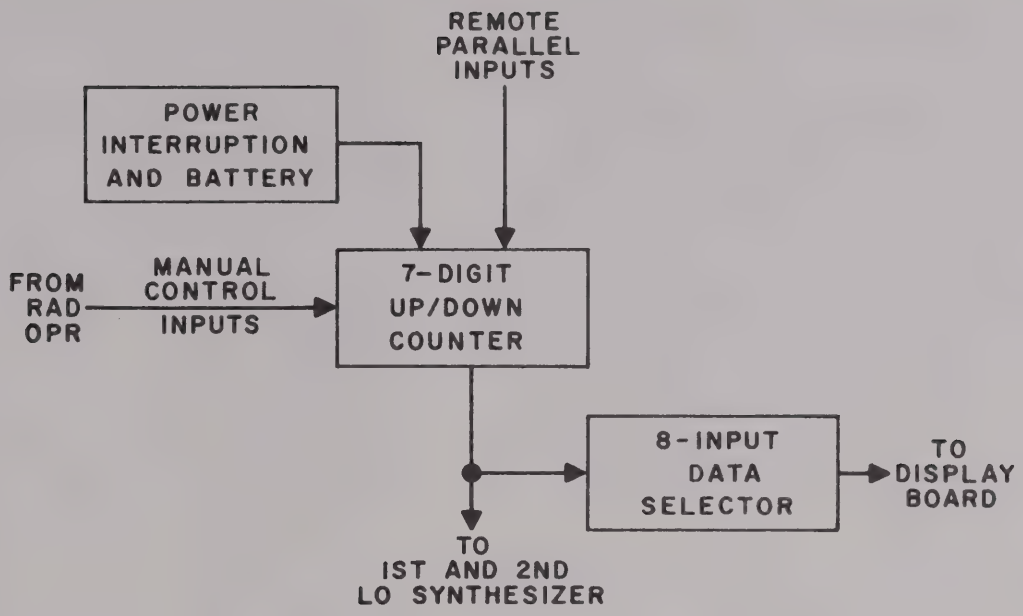


Figure 3-25. Manual Tuning Up/Down Counter Digital Diagram

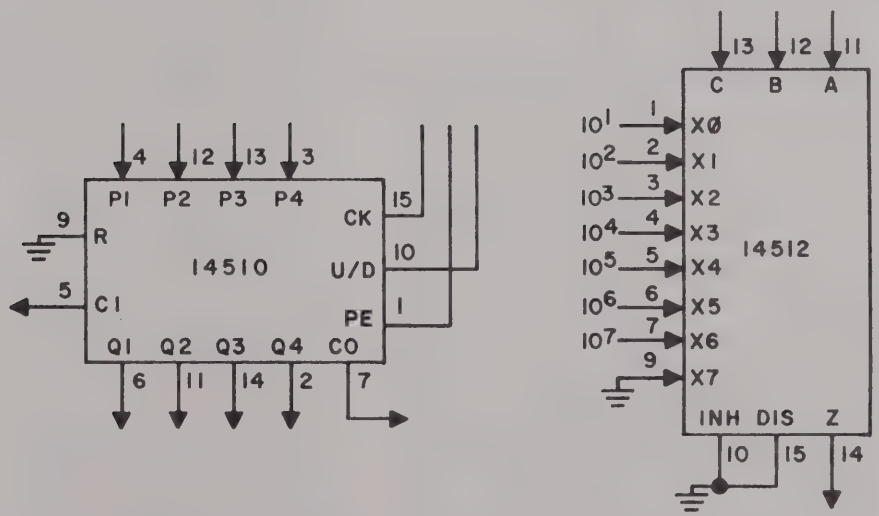


Figure 3-26. Up/Down Counter Integrated Circuit Data

(pin 1) is high, clocking is inhibited and the information on the P inputs is transferred to the corresponding Q outputs. Cascading of counters is accomplished by tying the carry input (pin 5) of one counter to the carry output (pin 2) of the preceding counter and by connecting the control inputs (clock, up/down, parallel enable) in parallel. If the carry input is high, the counter is inhibited from clocking. The carry output, normally high, goes low during a carry condition. Carry conditions occur when the counter is in a "0" state during down counting or when the counter is in a "9" state during up counting. Therefore, any stage in a counter chain will clock only when all preceding stages are in a carry condition.

d. Eight-input Data Selector. Integrated circuit 14512 is an eight-input data selector and is shown in figure 3-26. Control inputs A, B, and C select which of the data inputs, X_0 to X_7, is gated to output Z. The data input selected is determined by the binary equivalent of the control inputs. Refer to table 3-10. When activated, the disable line will force a low on the Z output and the inhibit input will cause it to go to the high impedance state. Inhibit and disable inputs are not used in this application.

e. Up/Down Counter Function. The schematic diagram for the manual tuning up/down counter is shown in figure FO-19. The up/down counter is composed of U2 through U11. U2 through U7 are MC14510's cascaded to form a six-digit presettable up/down decade counter. U1F, U8C, U9, U10, and U11 form the last stage of the counter. U9 is a dual JK flip-flop. U1F, U8C, U18B, U10B, and U10D form the logic to control the states of U9. During an up count, U9 will clock from 0 to 2 and then back to 0 again. Down counting will produce states in the opposite direction. U11, U10C, and U10A form the logic to preset U9. With the remote frequency load line low, the outputs of U11 will all be low, having no effect on U9. If the load line is high, U9A will reset if the 2^0 of 10^7 input is high and clear if it is low; U9B will reset if 2^1 of 10^7 is high and clear if it is low. There are no connections to the J1 remote input connector in this receiver. U8A, U8B, and U8D are used to gate the carry outputs of the first three stages to be used for the tuning resolution select. The tuning resolution switches (from front panel manual tuning module) provide a short to the step select switch output (from J4, pin 16, normally low) for the activated switch and an open circuit for the switches not selected. Resistors R5 to R8 are pull-up resistors to provide a high level on the open circuited lines. If the 10^1 switch is selected, counter U2 will be enabled. Since the other lines will all be high, all AND gates will be enabled. The resultant is a normal seven decade counter. If the 10^2 step select is chosen, AND gate U8D will be disabled. U2 will be inhibited since its carry input will be high. Since the carry input of U3 is now always low, it will clock for each pulse received on its clock input. U8B and U8A will still be enabled allowing for normal carry operation. The counter now behaves as though U2 is no longer in the circuit. If the 10^3 select is chosen, both U2 and U3 are disabled; if the 10^4 is chosen, U2, U3, and U4 are disabled.

f. Clock and Direction Signals. The clock and direction signals are from the manual tuning module. When up counting is desired, the clock line lags the direction line by 90°; when down counting is desired, it leads by 90°. U1A and U1E are Schmitt triggers to buffer the input signals. Since both clock and direction lines are inverted, the relative sense between the two signals is maintained. During up counting, the rising edge of the clock always occurs when the direction line is high, causing the counter to increment. In down counting, the rising edge always occurs when the direction line is low, decrementing the counter.

g. Remote Option. The P inputs of the counters provide for a remote control option, and are connected to the remote input jack, J1. When the remote frequency load line is pulsed high, the levels on the P lines will be transferred to the outputs of the counter. If the load line returns low the counter will resume clocking from the new data. The remote input jack also contains lines from the if. bandwidth select circuitry.

This allows remote control/monitor of the if. bw. Remote inputs are not used in this receiver.

h. Rf Frequency Information. The rf frequency information is sent to the 1st and 2nd lo synthesizers via the i/o and synthesizer motherboards. It is also sent to multiplexers U12 to U15. U12 receives the 2^0 bit of each digit, U13 receives the 2^1 bit, U14 receives the 2^2 bit, and U15 receives the 2^3 bit. The control inputs of U12 to U15 are all tied in parallel and applied to a binary counter U16. This counter is continuously clocked from an oscillator formed by U1C, U1B, C2, and R14. The frequency of oscillation is approximately 2.3 kHz. The outputs of U16 are also sent to J2 for decoding on the display board. The outputs of U12 to U15 are buffered by U17.

i. Data Selection. Operation of the data selector is as follows: when counter U16 has all zeros on its outputs, the A, B, and C inputs of U12 to U15 will be low. This will gate all X_0 inputs to their respective Z outputs. The information sent to the display board via J2 will be:

If $Q_2\ Q_1\ Q_0 = 000$, then:

$2^3\ 2^2\ 2^1\ 2^0 = 10^1$ Digit

When the oscillator clocks U16 again, the outputs will become 001. This will cause the X_1 input of each multiplexer to appear at its respective Z output. As the counter U16 clocks, all X inputs will be sent to the Z output in the code shown in table 3-11.

j. Decoding. This information can now be decoded on the display board. The display board determines which digit is present on the 2^3, 2^2, 2^1, and 2^0 lines by decoding the Q_2, Q_1, and Q_0 inputs.

k. Battery Power and Recharging. During power down the tuned frequency is remembered by powering the up/down counter from battery BT1. Diode CR1 is used to charge this nicad battery when power is on and to isolate the battery from the rest of the receiver when power is down. It is a hot carrier diode, dropping only about 0.4 V when forward biased. When power is on, V_{DD} is at 5 V, forward biasing the diode and charging the battery through R9. If power fails, V_{DD} drops to 0 V and diode CR1 becomes reverse biased, allowing battery current to flow only to the chips connected to V_{DD2}.

(1) Counter inhibit circuitry. The purpose of Q1 and its circuitry is to inhibit all counters when power down occurs. Without it, the counters could clock when power was again applied to the encoder assembly, because the clock input could go from a low (during power down) to a high (during power up).

Table 3-11. Data Selector 14512, Digit Control Codes

Q_2	Q_1	Q_0	$2^3\ 2^2\ 2^1\ 2^0$
0	0	0	10^1 Digit
0	0	1	10^2 Digit
0	1	0	10^3 Digit
0	1	1	10^4 Digit
1	0	0	10^5 Digit
1	0	1	10^6 Digit
1	1	0	10^7 Digit
1	1	1	All Low

(2) Inhibit function. Transistor Q1 controls the step select switch common. When power is on, the 10V across voltage divider R11 and R12 will turn Q1 on, which will place a low on the step select common. If the 10 V line drops below 7 V, the base of Q1 will drop below 0.7 V, and the transistor will turn off placing a high on the step select common through resistor R10. This high will prevent any of the step select lines from going low. The step select button chosen will short to a high level now, not a low, and the unchosen switches will still be pulled high by resistors R5 through R8.

3-48. FRONT PANEL INTERCONNECT (A6A2). The front panel interconnect provides control information for the receiver. To accomplish this task, it takes the manually selected data from the front panel controls and either directly or after decoding, relays it to the interior circuitry. Data relayed by the interconnect includes detection mode, if. bandwidth, gain mode, meter mode, bfo, and rf and headphone gain levels. The schematic diagram for this module is included in sheet 3 of the main chassis schematic, figure FO-1. This circuit description explains the operation of each manually-controlled input to this module and how it decodes and sends the information to the if. and bfo circuits.

a. Switch and Control Function. Inputs from the front panel controls are received through J1 and outputs go to the interior circuitry through XA2. As can be seen from the schematic diagram, most of the lines from the front panel are simply passed through to the rest of the receiver. For these lines, this module serves as a patch panel. Decoding for the if. bandwidth and detection mode front panel selections is implemented through diodes CR1 through CR10 and multiplexers U1 and U2. Figure 3-27 is a diagram of this multiplexer integrated circuit. This ic performs as three

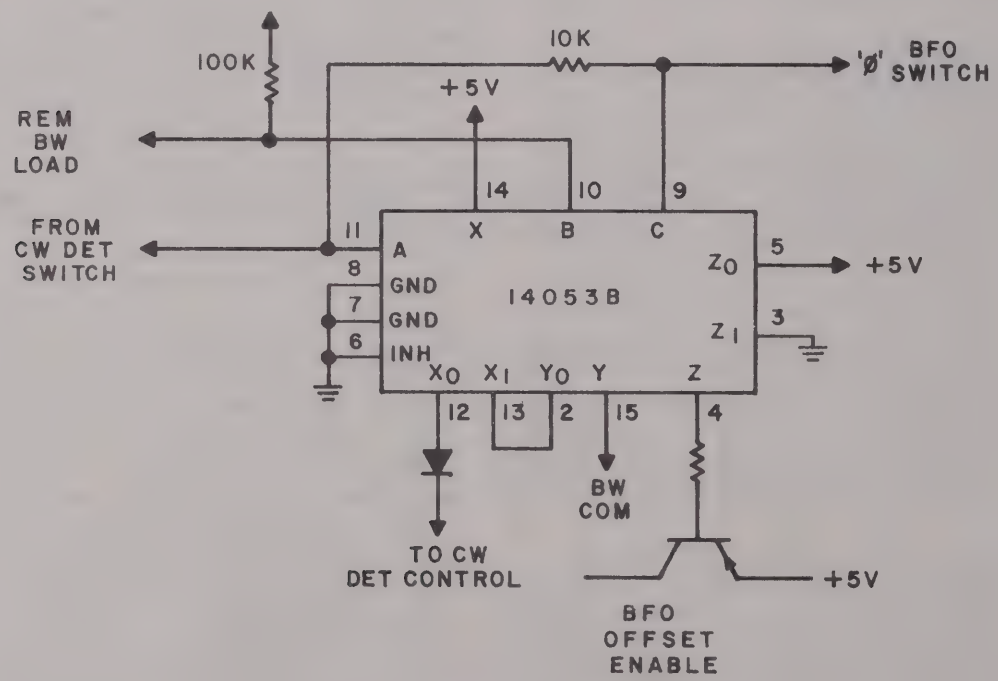


Figure 3-27. Front Panel Interconnect Integrated Circuit

digitally-controlled spdt switches. When control input A is logic low, terminals X and X_0 are internally connected. When A is logic high, X and X_1 are connected. Similarly, input B controls Y, Y_0, and Y_1 and input C controls Z, Z_0, and Z_1. This circuit performs logic functions associated with the front panel pushbuttons for detection mode (on A10A1) and if. bandwidth (on A10A2). Refer to both sheets 3 and 4 of figure FO-1 for the following descriptions.

NOTE

A10A1 E terminals E1 through E20 connect to A10P1-1 through -20.

A10A2 E terminals E1 through E20 connect to A10P1-21 through -40.

b. Filter Selection. Table 3-1 lists the filters activated in the 10.7 MHz filter (A4A1) and the 455 kHz filter (A4A3) modules for the various if. bandwidth selections on the front panel. The logic circuitry, consisting of CR1-CR3, CR5-CR10 and U2, activates (through connector XA2) the appropriate filters for the front panel if. bandwidth selections (through connector J1).

(1) When the 16 kHz if. bandwidth is selected, A10A2 terminals E15 and E19 are connected. This activates the 16 kHz wideband paths in both the 10.7 MHz and 455 kHz filter switch modules through CR9 and CR10. E19 receives +5 V through U1 in the am., fm and cw detection modes, as described later.

(2) When the 6 kHz if. bandwidth is selected, A10A2 terminals E12 and E19 are connected. This directly activates the 6 kHz filter in the 10.7 MHz filter module and, through CR8, activates the 16 kHz wideband path in the 455 kHz filter switch module.

(3) When the 3.2 kHz if. bandwidth is selected, A10A2 terminals E11 and E19 are connected. This directly activates the 3.2 kHz filter in the 10.7 MHz filter switch module and, through CR7 and the $X-X_0$ and Y_0-Y paths in U2 (A and B inputs at low), activates the 16 kHz wideband path in the 455 kHz filter switch module.

(4) When the 1.0 kHz if. bandwidth is selected, E8 connects to E19. This directly activates the 1.0 kHz filter in the 455 kHz filter switch module and, through CR6, activates the 3.2 kHz filter in the 10.7 MHz filter switch module. Here, the path through U2 is open since input A is high.

(5) When the .3 kHz if. bandwidth is selected, A10A2 terminals E7 and E19 are connected. This directly activates the .3 kHz filter in the 455 kHz filter switch and, through CR5, activates the 3.2 kHz filter in the 10.7 MHz filter switch. Here, the path through U2 is open since input B is high.

c. Mode Selection. As described below, in the lsb, usb and isb detection modes, the +5 V is removed from E19 (U1 path), and thus none of the filter paths in the 10.7 MHz or 455 kHz filter switches will be activated through this source. However, in the lsb, usb or isb detection modes the detection mode selection switch places a high on A10A1 terminals E7, E8 or E11 (from the detection mode switch), respectively. This activates the 16 kHz wideband path in the 10.7 MHz filters switch through CR3, CR2 or CR1, respectively.

(1) When the cw mode is selected, the detection mode switch connects A10A1 terminals E4 to E12, and E5 to E6. This places +5 V on the cw select line to if. motherboard A4. Input B of U1 is controlled by the remote bandwidth control line entering at XA2 pin 11. Since this line is logic low in local mode, U1 input B is normally low, and Y is connected to Y_0. Therefore, when E5 is connected to E6, the +5 V at U1 input A causes the +5 V line at X to be connected through X1, Y_0, and Y, to E19 and the if. bandwidth switch common line, enabling these switches. Therefore, any bandwidth may be selected in the cw mode. If "0" is selected on the "+, 0 ,-" bfo switch, the switch common (ground) places a low on U1 input C. Z and Z_0 are connected, Q1 is turned off, and the resulting low voltage at XA2 pin 58 causes the bfo preset lines to be pulled low, producing a fixed 455 kHz bfo frequency. (Refer to paragraph 3-34 for a description of the bfo presets.) If "+" or "-"

is selected, the ground is removed and U1 input C is pulled high by R7. Q1 is turned on and power is applied to the bfo preset pull-up resistors, entering whatever frequency code is present at the bfo switch. Therefore, the bfo may be either fixed or variable in the cw mode.

(2) When the am. mode is selected, the detection mode switch connects E4 to E16, and E5 and E14 to E6. This places +5 V on the am. select line (to A4) and allows +5 V on the bandwidth switch common line (E19), enabling these switches. This also places +5V on XA2 pin 60, which inhibits bfo operation.

(3) When the fm mode is selected, the detection mode switch connects E4 to E15, and E5 and E14 to E6. This places +5 V on the fm select line (to A4), enables the bandwidth switches and inhibits the bfo, as previously described.

(4) When the usb mode is selected, the detection mode switch connects E4 to E8 and grounds E5 and E14. This places +5 V on the usb select line (to A4) and places a low at U1 input A. This disables the if. bandwidth switches and turns off Q1, fixing the bfo at 455 kHz, as previously described.

(5) When the lsb mode is selected, the detection mode switch connects E4 to E7 and grounds E5 and E14. This places +5 V on the lsb select line, disables the if. bandwidth switches and fixes the bfo at 455 kHz.

(6) When the isb mode is selected, the detection mode switch connects E4 to E11, E9 to E10, and opens the normal connection between E10 and E13. Connecting E4 to E11 places +5 V on the isb select line to A4. In all other modes, the combined audio line is supplied to both audio amplifiers on A10A2, via E9 and E3. In the isb mode, the combined audio line to A10A2E9 is replaced by the isb/lsb audio line, via the E9-E10 connection. Therefore, the usb audio is supplied to A10A2 headphone amplifier U1A via the combined audio line, and the lsb audio is supplied to amplifier U1B.

3-49. MANUAL TUNING MODULE (A7). The manual tuning module controls the direction and rate of change of the tuned frequency. This module connects to the manual tuning up/down counter (A6A1) and is mounted behind the receiver front panel. The manual tuning module consists of two parts: the encoder assembly and the tuning resolution switches. The schematic diagram of this module can be found in sheet 4 of figure FO-1.

a. Tuning Resolution (A7A1). The tuning resolution switches select the desired tuning step to be used. The tuning steps are: 10 Hz, 100 Hz, 1 kHz, and 10 kHz. Switching is accomplished by connecting the desired tuning step to the step select switch line (+5 V) of the manual tuning up/down counter board (A6A1).

(1) When the 10 Hz button is depressed, E2 (10 Hz step line) connects to E16 (+5 V) and all digits are available for tuning. When the 100 Hz button is depressed, E10 (the 100 Hz step line) connects to E16 (+5 V). The 10 Hz digit is locked to the frequency indicated when the 100 Hz button was engaged, while all other digits are available for tuning. When the 1 kHz button is depressed, E12 connects to E16, thus the five most significant digits of the readout can be varied by the tuning knob. The two least significant digits will be locked to the frequency indicated when this button is engaged. When the 10 kHz button is selected, E8 connects to E16 and only the four most-significant digits of the readout can be varied by the tuning knob. The 1 kHz, 100 Hz, and 10 Hz digits will be locked to the frequency indicated when the 10 kHz button is engaged.

(2) When the DSBL/RMT pushbutton is depressed, the receiver locks to the frequency currently being displayed. Any other tuning button is released, and manual tuning is disabled.

b. Encoder Assembly (A7U1). This assembly converts tuning knob rotation to digital pulses for the manual tuning up/down counter. When the tuning knob is turned, each of the two output lines from the encoder (DIR and CLK) will swing repeatedly

between approximately +5 V and 0 V. If the knob is rotated at constant speed, these two outputs then appear as trains of square waves. Due to the internal mechanics of the encoder, the transitions of these two wave trains will be staggered in time with respect to each other. When the knob is rotated clockwise to increase tuned frequency, the square wave on the direction line then appears to lead that on the clock line as shown in figure 3-28. The action of the up/down counter depends on the level of its up/down input at the instant its clock line goes high. The level of the up/down input at any other time has no effect. Therefore, clockwise rotation causes the counter to count up and the tuned frequency to increase. The encoder assembly uses infrared optics to accomplish its internal functions.

(1) If the tuning knob is rotated counterclockwise, the sequence of outputs is reversed; the direction square wave lags the clock square wave. In this case the direction line will be low when the clock line swings high causing the counter to count down, reducing the tuned frequency.

(2) The two outputs of the encoder go through approximately 120 cycles per revolution of its input shaft. This causes a tuning step for roughly each 3° of knob rotation.

3-50. FREQUENCY DISPLAY (A8). The frequency display accepts the multiplexed data from the manual tuning up/down counter via connector J2 (see sheets 3 and 4 of figure FO-1) and displays it on a seven digit LED readout on the front panel. The schematic diagram for this circuit is figure FO-20. U1 to U7 are the seven segment common-cathode LED displays. All segments of each display are connected in parallel to the corresponding outputs of U8, a bcd to seven-segment decoder/driver. U8 accepts a bcd word on its A, B, C and D inputs, converts it to a seven-segment equivalent, and places the information on its a to g outputs. The outputs are internally current limited to provide about 50 mA so that external resistors are not needed. To turn a particular digit on, its common cathode input must be logic low. This selection is provided by U9, a binary to octal decoder. It accepts the Q0 to Q2 data on its A, B, and C inputs and places a high on the Q output with the equivalent binary value. U10 is an eight-section buffer inverter, capable of providing up to 500 mA of sink current.

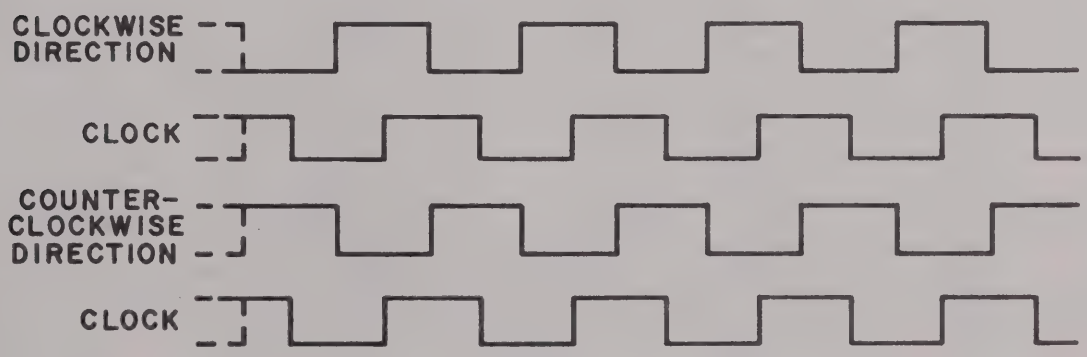


Figure 3-28. Encoder Assembly Timing Diagram

a. Digital Data. The up/down counter places digit display information into the A, B, and C inputs of U9. Bcd information enters the A, B, C and D lines of U8. In U8, this information is decoded into a seven-segment number and sent to all the seven segment displays. U9 enables only one display at a time as commanded by its input information. Since the rate of change is 2 kHz, each digit is refreshed every 4 msec (2 kHz/8). This flicker rate is undetectable by the human eye.

b. Intensity Control. Transistor Q1 is used for the intensity control. It is connected as a pass transistor from the unregulated 10 V to the supply voltage of U8. As the supply voltage of U8 is increased, the current delivered to the LED increases giving more intensity. R1, R2, and R4 are voltage dividers which establish the emitter voltage of Q1 between about 4.5 V and 7 V.

c. Decimal Point. The decimal point, CR1, is always on, receiving its current from Q1 through resistor R3.

3-51. BFO SWITCH (A9). The bfo switch schematic diagram can be found in sheet 5 of the main chassis schematic diagram figure 5-22. Three thumbwheel switches provide a bfo variation of ±8.9 kHz from 455 kHz. The +, 0, -, thumbwheel provides the direction of offset, the second thumbwheel varies in range from 0 to 8, and the third thumbwheel varies in range from 0 to 9. A '0' setting of the direction thumbwheel causes the bfo to return automatically to 455 kHz (regardless of the other thumbwheel settings). The truth table for these switches is given in table 3-12.

3-52. FRONT PANEL CONTROL (A10). The front panel control consists of the upper and lower panel control boards joined by a 40-pin ribbon connector. This connector is attached to the front panel interconnect

Table 3-12. Bfo Switch Truth Table

First switch				Second* and third switches				
Switch position	Output 2^2	Output 2^1	Output 2^0	Switch position	Output 2^3	Output 2^2	Output 2^1	Output 2^0
-	0	0	1	0	0	0	0	0
+	0	1	1	1	0	0	0	1
0	1	1	0	2	0	0	1	0
				3	0	0	1	1
				4	0	1	0	0
				5	0	1	0	1
				6	0	1	1	0
				7	0	1	1	1
				8	1	0	0	0
				9	1	0	0	1

* Second switch has switch positions 0 through 8 only.

(A6A2) and controls the manual selection of detection mode, gain mode, meter mode, if. bandwidth, rf gain, and headphone levels. Signals for the phone outputs also connect to the lower panel control through the front panel interconnect. The functions of the if. bandwidth and detection mode switches are described in paragraphs 3-48 through 3-48c(6).

a. Upper Panel Control (A10A1). The upper panel control allows selection of detection mode, gain mode, and meter mode. Each gang of switches mechanically operates to allow only one pushbutton to be depressed at any time. All control lines connect to the front panel interconnect card. The schematic diagram for this circuit is shown on sheet 4 of figure FO-1.

b. Lower Panel Control (A10A2). The lower panel control allows selection of if. bandwidth and variation of rf gain and phone level potentiometers. The schematic diagram for this circuit is shown on sheet 4 of figure FO-1. This card also contains the amplifiers to drive the headphone outputs. The amplifiers operate independently. They receive the same signal in all detection modes except isb. In this mode, amplifier U1A receives the upper sideband information while U1B receives the lower sideband information. No damage is done to the amplifiers when using mono headphones; however, lsb in the isb mode is not monitored.

3-53. POWER SUPPLY SECTION. Refer to the schematic diagram, sheet 1 of figure FO-1. The receiver may be operated from either 115 Vac ±15% or 230 Vac ±15%. The input voltage feeds power input filter assembly (A13), for initial filtering. The two filter output lines each pass through fuses (F1 and F2), the POWER PUSH ON/OFF switch S1 (one switch in each line) and the voltage selector switches, S3 and S4, before driving power transformer T1. S3 is used to select 115 Vac/230 Vac while S4 is used to select HI/LO for the input line voltage. T1 has a dual primary and two center-tapped secondaries, with 34 Vac across pins 9-11 and 16 Vac across pins 6-8.

a. Power Distribution (A1). The 34 Vac enters this board and is full-wave rectified by A1CR1, CR2, CR3, and CR4. The voltage is then filtered by A1C1 and A1C2 and sent to regulators U1, U2 and U4. The 16 Vac is rectified by CR1 and CR2, which are located on the back of the chassis, and applied to the distribution board to be filtered by A1C3 and A1C4 to become a +10 V unregulated supply.

b. Power Supply Regulators. Refer to the schematic diagram, sheet 1 of figure FO-1. U1 and U2 are located on the back of the chassis and provide regulated +15 Vdc and -15 Vdc, respectively. These two voltages are supplied to most of the circuits in the receiver. The unregulated 10 Vdc, with its unregulated ground, connects to U3, a +5 Vdc regulator located on the back of the chassis. U3 supplies +5 Vdc to the bfo and 2nd lo synthesizers, the up/down counter board, and the front panel interconnect card. The unregulated 10 Vdc also connects to A5U1 and A5U2, which are +5 Vdc regulators for the 1st and 3rd lo synthesizers. The regulators all have internal protection from thermal and current overload. U1 and U2, on the rear panel, automatically shut down when current exceeds 1 A. Similarly, U3 on the rear panel shuts down when current exceeds 3 A. U4, located on the bottom side of the power supply compartment baseplate, provides regulated +12 Vdc for the audio amplifier (A4A10). The unregulated input to U4 also goes to activate the front panel elapsed time meter (M2) when power is turned on. U4 shuts down when current exceeds 0.5A.

CHAPTER 4

SCHEDULED MAINTENANCE

4-1. INTRODUCTION. This chapter describes maintenance procedures and performance tests which are performed on a scheduled basis. The scheduled maintenance action index is discussed in paragraph 4-2, preventive maintenance procedures are given in paragraph 4-3, and scheduled performance tests are given in paragraph 4-4.

NOTE

The scheduled maintenance instructions in this manual are cancelled when the Planned Maintenance System (PMS) is implemented for this equipment aboard your ship or station.

4-2. SCHEDULED MAINTENANCE ACTION INDEX. This index, contained in table 4-1, shows all actions deemed necessary to complete the scheduled maintenance, the recommended performance intervals, and reference to appropriate sections of the manual containing maintenance details.

4-3. PREVENTIVE MAINTENANCE PROCEDURES. Step-by-step procedures are given in this paragraph for lubrication, cleaning, and inspection of the receiver.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Lubrication Procedures. This procedure may be performed by any qualified operator of the equipment. The optical encoder assembly shaft requires periodic lubrication to prevent excessive wear. No other parts of the receiver require

Table 4-1. Scheduled Maintenance Action Index

Periodicity*	Maintenance Action	Reference
M	Lubrication	Paragraph 4-3a
	Cleaning	Paragraph 4-3b
	Inspection for damage or wear	Paragraph 4-3c
S	Performance tests	Paragraph 4-4
	Adjustment/Alignment	Chapter 6, Section I

*M = monthly
*S = semiannually

lubrication. To lubricate the encoder assembly shaft, perform the following steps:

CAUTION

Excessive lubrication of the encoder shaft may destroy the optical characteristics of the encoder wheel.

(1) Place receiver in vertical position.

(2) Remove knob from encoder shaft.

(3) Apply one drop of oil (SAE 5W-20W, NSN 9150-00-262-7617) to the encoder shaft at the retaining ring.

(4) Reinstall knob on encoder shaft.

(5) Rotate shaft several times.

b. Cleaning Procedures. These procedures may be performed by a Navy electronics technician third class (or higher rating). Remove accumulated dust, grease, and other contamination. Use materials listed in table 4-2. Perform the following steps:

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, zylene, acetone, or similar solvents. These chemicals may damage plastics used in this receiver.

(1) Dust receiver cabinet with soft cloth.

(2) Dust front panel controls with small, soft-bristled brush.

(3) Remove dirt clinging to cabinet with clean, lint-free cloth dampened with solution of mild detergent and water.

(4) Remove top and bottom covers.

Table 4-2. Materials Required for Maintenance

Material	Type/NSN	Purpose
Alcohol, isopropyl	NSN 6810-00-664-0273	Clean switch contacts
Brush, soft-bristle	1 inch, NSN 8020-00-721-9646	General cleaning
Cloth, lint-free	NSN 7920-00-985-6849	General cleaning
Compound, cleaning, trichloroethane	Federal Spec. O-T-620C, NSN 6810-00-664-0275	Grease and stain removal
Oil, lubricating	SAE 5 W NSN 9150-00-262-7617	Shaft lubrication
Paint, gray	Semigloss enamel, type III, class 2, NSN 8010-00-577-4736	Finish painting
Primer, zinc-chromate	Yellow, MIL-P-8585, NSN 8010-00-297-0593	Metal priming
Sandpaper, fine	No. 400, NSN 5350-00-224-7201	Corrosion removal

(5) Remove dust from interior of receiver with dry low-pressure compressed air or soft-bristled brush.

(6) Remove clinging dirt with clean, lint-free cloth or cotton-tipped applicator dampened in solution of mild detergent and water.

(7) Clean switch contacts, as required, with isopropyl alcohol.

(8) Reinstall top and bottom covers.

c. Inspection Procedures. These procedures may be performed by a Navy electronics technician third class (or higher rating). A complete visual inspection should be made on a routine basis when the receiver is inoperative. Many potential or existing faults can be detected by performing the following steps:

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Inspect equipment covers and front panel for condition of finish and panel markings.

(2) Inspect for dents, punctures, or warped areas.

(3) Inspect quarter-turn fasteners for fastness.

(4) Inspect external surfaces for loose or missing screws or washers.

(5) Inspect receptacles for conditions of pins, contacts, and mountings.

(6) Inspect internal components for signs of deterioration, discoloration, or charring.

(7) Check for melted insulation and damaged, cracked, or broken components.

(8) Inspect printed circuit boards for damaged tracks, loose connections, corrosion, or other signs of deterioration.

(9) Inspect pc connectors, interface connectors, and chassis wiring for excessive wear, looseness, misalignment, corrosion, or other signs of deterioration.

4-4. SCHEDULED PERFORMANCE TESTS. The performance tests determine if the receiver operates in all detection modes, gain modes and if. bandwidths. These tests should be used for initial inspection, periodic operational checks, or to confirm performance standards after repairs have been made. Only technicians of the prescribed rating or above should perform the tests. Tests should be carried out using the prescribed equipment or authorized substitute only. If a receiver fault is encountered as a result of conducting a given test, refer to the troubleshooting index, table 5-1, for corrective procedures.

a. Procedure Guidelines. When conducting the performance tests the technician shall comply with the following provisions:

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Read each paragraph and test procedure carefully before attempting to perform the test.

(2) All tests are to be performed under the following environmental conditions unless otherwise specified:

Temperature:	+25° C ±5° C (+77° F ±9° F)
Altitude:	Room ambient
Humidity:	Room ambient

(3) Allow a minimum of 30 minutes warm-up time for test equipment prior to performing any of the tests.

(4) All inputs to and outputs from the equipment under test which are not used during a particular test are to be terminated with their characteristic impedances.

(5) All equipment covers shall be in place unless a particular test requires their removal.

(6) The tests should be performed in the order given. If a receiver problem is noted, refer to chapter 5 for troubleshooting information.

b. Operator Performance Test. A qualified operator with an electronics technician rating may perform this test. The test verifies the operation of all receiver controls and indicators. No test equipment is required.

(1) Turn RF GAIN control fully counterclockwise.

(2) Turn PHONE LEVEL control fully counterclockwise.

(3) Depress IF BANDWIDTH kHz-16 pushbutton.

(4) Verify yellow indicator in this pushbutton.

(5) Set KILOHERTZ-BFO OFFSET thumbwheels to +0.0.

(6) Depress DETECTION MODE-AM pushbutton.

(7) Verify yellow indicator in this pushbutton.

(8) Depress GAIN MODE-MAN pushbutton.

(9) Verify yellow indicator in this pushbutton.

(10) Depress METER-SIGNAL STRENGTH pushbutton.

(11) Verify yellow indicator in this pushbutton.

(12) Depress POWER PUSH ON/OFF pushbutton switch.

(13) Verify red indicator in this pushbutton.

(14) Verify that MEGAHERTZ display is brightly and uniformly lit.

(15) Depress the 10 Hz tuning resolution pushbutton.

(16) Verify green indicator in this pushbutton.

(17) Rotate tuning knob until 10 Hz digit (last digit on MEGAHERTZ display) indicates 0.

(18) Depress the 100 Hz tuning resolution pushbutton.

(19) Verify green indicator in this pushbutton, that 10 Hz pushbutton is released, and its indicator is black.

(20) Rotate tuning knob until 100 Hz digit (next to last digit on MEGAHERTZ display) indicates 0.

(21) Depress the 1 kHz tuning resolution pushbutton.

(22) Verify green indicator in this pushbutton, that 100 Hz pushbutton is released, and its indicator is black.

(23) Rotate tuning knob until the 1 kHz digit (third from last on MEGAHERTZ display) indicates 0.

(24) Depress 10 kHz tuning resolution pushbutton.

(25) Verify green indicator in this pushbutton, that 1 kHz pushbutton is released, and its indicator is black.

(26) Depress DSBL/RMT pushbutton.

(27) Verify green indicator in this pushbutton, that 10 kHz pushbutton is released, and its indicator is black.

(28) Rotate tuning knob and verify that MEGAHERTZ display does not change.

(29) Push and release POWER PUSH ON/OFF pushbutton switch.

(30) Verify this pushbutton is released, its indicator is black, and MEGAHERTZ display is off.

c. If. Gain and Bandwidth Test. A Navy electronics technician with a second class, or higher, rating should perform this test. The if. gain and bandwidth test verifies correct operation of bandwidth circuits and the power output of each.

(1) A signal generator, an rf voltmeter, and a 50-ohm rf probe are needed for this test.

(2) The test equipment is set up and connected as shown in figure 4-1.

(a) Set the signal generator output frequency to 15.00500 MHz unmodulated and output level to -103 dBm.

(b) Set the rf voltmeter to -20 dBm range.

(c) Set the receiver controls as follows:

1 Turn RF GAIN fully clockwise.

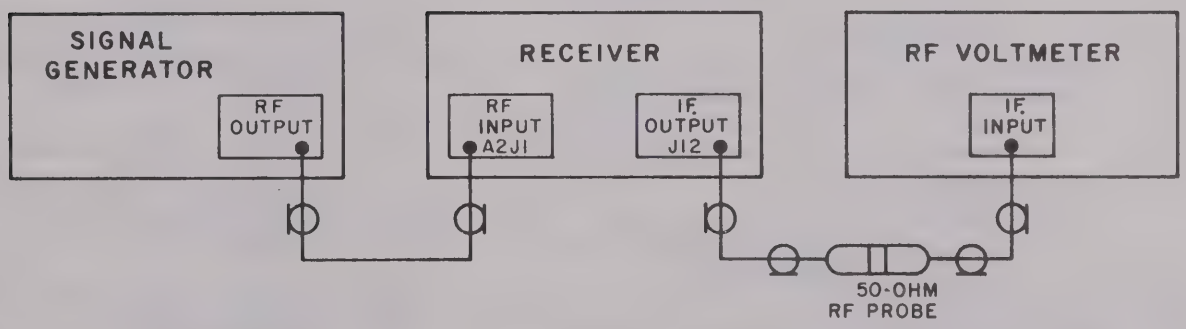


Figure 4-1. If. Gain and Bandwidth Performance, Test Setup

2 Turn PHONE LEVEL fully counterclockwise.

3 Depress IF BANDWIDTH kHz -16 pushbutton.

4 Depress DETECTION MODE-AM pushbutton.

5 Depress GAIN MODE-MAN pushbutton.

6 Depress METER-SIGNAL STRENGTH pushbutton.

(3) If. gain and bandwidth test procedures. The test comprises the following steps:

(a) Depress POWER PUSH ON/ OFF pushbutton switch.

(b) Depress 1 kHz pushbutton.

(c) Rotate tuning knob and tune receiver to 15.00500 MHz.

(d) Verify 1/4 to 1/2 full scale reading on panel meter.

(e) Verify reading of -21 dBm, ±2 dBm on rf voltmeter.

(f) Depress IF BANDWIDTH kHz -6, 3.2, 1.0, and .3 pushbuttons in succession.

(g) Verify -21 dBm, ±2 dBm reading on rf voltmeter for each pushbutton position in step (f) above.

(h) Set signal generator output frequency to 15.00650 MHz.

(i) Depress DETECTION MODE-USB pushbutton.

(j) Verify reading of -21 dBm, ±2 dBm on rf voltmeter.

(k) Set signal generator output frequency to 15.00350 MHz.

(l) Depress DETECTION MODE-LSB pushbutton.

(m) Verify reading of -21 dBm, ±2 dBm on rf voltmeter.

(n) Disconnect signal generator from RF INPUT A2J1.

(o) Connect 50-ohm termination to RF INPUT-A2J1.

(p) Depress DETECTION MODE-AM pushbutton.

(q) Depress IF BANDWIDTH kHz -16 pushbutton.

(r) Verify reading of -38 dBm, ±2 dBm on rf voltmeter.

(s) Depress IF BANDWIDTH kHz -6 pushbutton.

(t) Verify reading of -42 dBm, ±2 dBm on rf voltmeter.

(u) Depress IF BANDWIDTH kHz -3.2 pushbutton.

(v) Verify reading of -45 dBm, ±2 dBm on rf voltmeter.

(w) Depress DETECTION MODE-USB pushbutton and LSB pushbutton in succession.

(x) Verify reading of -45 dBm, ±2 dBm on rf voltmeter for both pushbutton positions in step (w) above.

(y) Depress DETECTION MODE-AM pushbutton.

(z) Depress IF BANDWIDTH kHz -1.0 pushbutton.

(aa) Verify reading of -50 dBm, ±2 dBm on rf voltmeter.

(ab) Depress IF BANDWIDTH kHz -.3 pushbutton.

(ac) Verify reading of -55 dBm, ±2 dBm on rf voltmeter.

(ad) Depress and release POWER PUSH ON/OFF pushbutton switch.

(ae) Disconnect test equipment.

d. Signal-to-noise Ratio Test. A Navy electronics technician with a second class, or higher, rating should perform this test. The signal-to-noise ratio (snr) test verifies that the receiver's snr is within specifications.

(1) A signal generator, an rf voltmeter, and a 50-ohm rf probe are needed for this test.

(2) The test equipment is set up and connected as shown in figure 4-1.

(a) Set the signal generator output frequency to 29.99990 MHz unmodulated and output level to -103 dBm.

(b) Set the rf voltmeter to the -20 dBm range.

(c) Set the receiver controls as follows:

1 Turn RF GAIN fully clockwise.

2 Turn PHONE LEVEL fully counterclockwise.

3 Depress IF BANDWIDTH kHz -6 pushbutton.

4 Depress DETECTION MODE-AM pushbutton.

5 Depress GAIN MODE-MAN pushbutton.

6 Depress METER-SIGNAL STRENGTH pushbutton.

(3) Signal-to-noise ratio test procedures. The test comprises the following steps:

(a) Depress POWER PUSH ON/OFF pushbutton switch.

(b) Depress 10 Hz pushbutton.

(c) Rotate tuning knob and tune receiver to 29.99990.

(d) Verify and record reading of -21 dBm, ±2 dBm on rf voltmeter.

(e) Turn signal generator RF ON/OFF switch off.

(f) Verify that reading on rf voltmeter has dropped at least 10 dB.

(g) Depress and release POWER PUSH ON/OFF pushbutton switch.

(h) Disconnect test equipment.

e. Detection Mode Test. A Navy electronics technician with a second class, or higher, rating should perform this test. The detection mode test verifies response and quality of detection circuitry and line audio output levels.

(1) A signal generator, ac voltmeter, dual-trace oscilloscope, headphones, and two 600-ohm resistors are needed for this test.

(2) The test equipment is set up and connected as shown in figure 4-2.

(a) Set the signal generator output frequency to 15.00500 MHz and output level to -97 dBm. Set the generator for 50% am. modulation at 400 Hz.

(b) Set the ac voltmeter to the 50 Vac range.

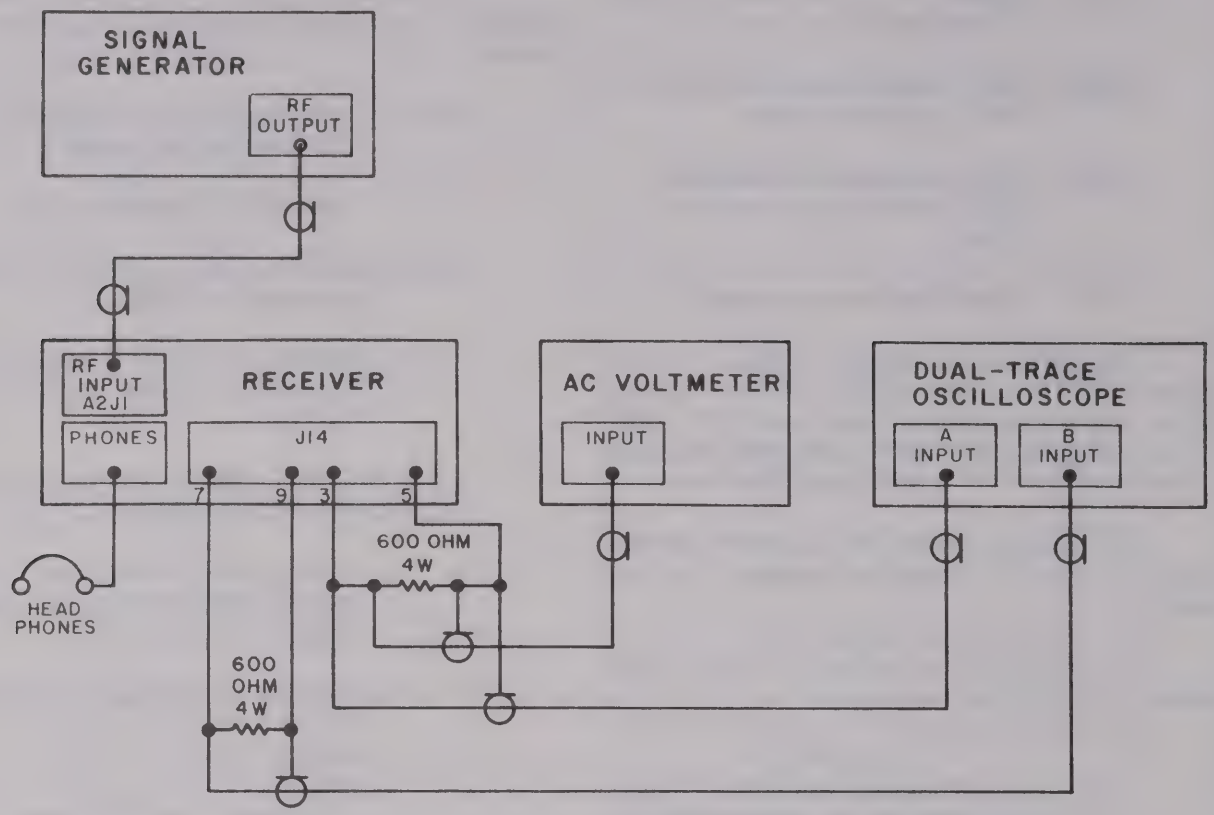


Figure 4-2. Detection Mode Performance, Test Setup

(c) Set the oscilloscope to display the A vertical input.

(d) Set the receiver controls as follows:

1 Turn RF GAIN fully clockwise.

2 Turn PHONE LEVEL fully counterclockwise.

3 Adjust R1-LINE AUDIO LEVEL fully counterclockwise.

4 Depress IF BANDWIDTH kHz -6 pushbutton.

5 Depress DETECTION MODE-AM pushbutton.

6 Depress GAIN MODE-MAN pushbutton.

7 Depress METER-LINE AUDIO pushbutton.

(3) Detection mode test procedures. The test comprises the following steps:

(a) Depress POWER PUSH ON/OFF pushbutton switch.

(b) Depress 1 kHz pushbutton.

(c) Rotate tuning knob and tune receiver to 15.00500 MHz.

(d) Turn PHONE LEVEL control clockwise until 400 Hz tone is heard comfortably in headphones.

CAUTION

Line audio output levels in excess of 24.5 Vac (with attenuator A11 off) may cause damage to the receiver and/or the 600-ohm load resistor. With A11 on, levels must not exceed 0.774 Vac.

NOTE

The 400 Hz tone should be clear, distinct, and free from noise, hum, or other signal distortions.

(e) Adjust R1-LINE AUDIO LEVEL until ac voltmeter indicates 24.5 Vac with attenuator A11 off, and 0.774 Vac with attenuator A11 on.

(f) Verify that oscilloscope shows clean sine wave with no clipping or distortion.

(g) Turn off signal generator modulation.

(h) Depress DETECTION MODE-CW pushbutton.

(i) Depress IF BANDWIDTH kHz - 1.0 pushbutton.

(j) Set KILOHERTZ-BFO OFFSET to +0.4.

(k) Listen for clear, distinct 400 Hz tone in headphones.

(l) Set signal generator output frequency to 15.00540 MHz.

(m) Depress DETECTION MODE-USB pushbutton.

(n) Listen for clear, distinct 400 Hz tone in headphones.

(o) Set signal generator output frequency to 15.00460 MHz.

(p) Depress DETECTION MODE-LSB pushbutton.

(q) Listen for clear, distinct 400 Hz tone in headphones.

(r) Depress oscilloscope B vertical input button.

(s) Observe clean sine wave of approximately 22 volts p-p with attenuator A11 off, and approximately 2.2 volts p-p with attenuator A11 on. Sine wave should show no clipping or distortion.

(t) Set signal generator output frequency to 15.0050 MHz.

(u) Set signal generator modulation to fm with modulation frequency of 400 Hz, and deviation to 4.8 kHz.

(v) Depress IF BANDWIDTH kHz -16 pushbutton.

(w) Depress DETECTION MODE - FM pushbutton.

(x) Listen for clear, distinct 400 Hz tone in headphones.

(y) Depress and release the POWER PUSH ON/OFF pushbutton switch.

(z) Disconnect test equipment.

f. Manual/Automatic Gain Control Test. A Navy electronics technician with a second class, or higher, rating should perform this test. The manual/automatic gain control test checks the operation of both modes of automatic gain control and also the manual gain circuitry.

(1) A signal generator, an ac voltmeter, and a 600-ohm, 4 W resistor are needed for this test.

(2) The test equipment is set up and connected as shown in figure 4-3.

(a) Set the signal generator output frequency to 15.00500 MHz and output level to -97 dBm. Set the generator for 50% am. modulation at 400 Hz.

(b) Set the ac voltmeter to 50 Vac range.

(c) Set the receiver controls as follows:

1 Turn RF GAIN fully clockwise.

2 Depress IF BANDWIDTH kHz -6 pushbutton.

3 Depress DETECTION MODE - AM pushbutton.

4 Depress GAIN MODE-MAN pushbutton.

(3) Manual/automatic gain control test procedures. The test comprises the following steps:

(a) Depress POWER PUSH ON/ OFF pushbutton switch.

(b) Depress 1 kHz pushbutton.

(c) Rotate tuning knob to tune receiver to 15.00500 MHz.

CAUTION

Line audio output levels in excess of 24.5 Vac (with attenuator A11 off) may cause damage to the receiver and/or the 600-ohm load resistor. With A11 on, levels must not exceed 0.774 Vac.

(d) Adjust R1-LINE AUDIO LEVEL until ac voltmeter indicates 24.5 Vac with attenuator A11 off, and 0.774 Vac with attenator A11 on.

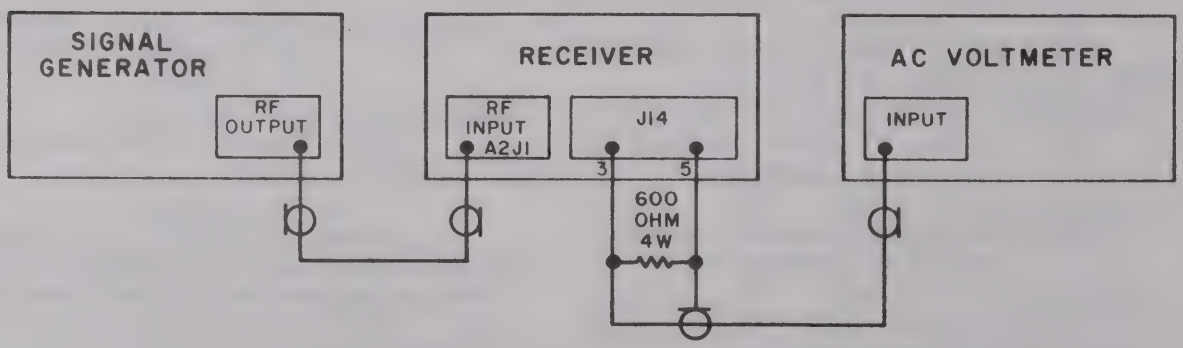


Figure 4-3. Manual/Automatic Gain Control Performance, Test Setup

(e) Turn RF GAIN fully counterclockwise.

(f) Increase signal generator output level to +3 dBm.

NOTE

Ac voltmeter reading should be no greater than 24.5 Vac with attenuator A11 on and not greater than 0.774 Vac with attenuator A11 off.

(g) Turn RF GAIN clockwise until ac voltmeter indicates 24.5 Vac with A11 off and 0.774 Vac with A11 on.

(h) Decrease signal generator output level to -97 dBm.

(i) Depress GAIN MODE-AGC-FAST pushbutton.

(j) Adjust R1-LINE AUDIO LEVEL for ac voltmeter indication of 12.25 Vac with A11 off and 0.387 Vac with A11 on.

(k) Increase signal generator output level to +3 dBm.

NOTE

Ac voltmeter reading should be no greater than 24.5 Vac with attenuator A11 off and no greater than 0.774 Vac with attenuator A11 on.

(l) Depress GAIN MODE-AGC-SLOW pushbutton. The ac voltmeter reading should not change.

(m) Depress and release POWER PUSH ON/OFF pushbutton switch.

(n) Disconnect test equipment.

g. Frequency Tuning Test. A Navy electronics technician with a second class, or higher, rating should perform this test. The frequency tuning test checks the accuracy of receiver tuning by verifying its intermediate frequency accuracy.

(1) A signal generator and a frequency counter are needed for this test.

(2) The test equipment is set up and connected as shown in figure 4-4.

(a) Set signal generator output frequency to 00.50001 MHz, unmodulated, and output level to -97 dBm.

(b) Set frequency counter to provide 10 Hz resolution at a 1 second sample rate.

(c) Set the receiver controls as follows:

1 Depress IF BANDWIDTH kHz -6 pushbutton.

2 Depress DETECTION MODE-AM pushbutton.

3 Depress GAIN MODE-AGC-FAST pushbutton.

(3) Frequency tuning test procedures. The test comprises the following steps:

(a) Depress POWER PUSH ON/OFF pushbutton switch.

(b) Depress 10 Hz pushbutton.

(c) Rotate tuning knob and tune receiver to 00.50001 MHz.

(d) Verify frequency counter if. output frequency indication of 455 kHz ±0.10 kHz.

(e) Increase signal generator output frequency to 29.99999 MHz.

(f) Rotate tuning knob and tune receiver to 29.99999 MHz.

(g) Verify frequency counter if. output frequency indication of 455 kHz ±0.10 kHz.

(h) Depress and release POWER PUSH ON/OFF pushbutton switch.

(i) Disconnect test equipment.

NOTE

If receiver fails to meet the parameters specified, refer to table 5-1 for corrective procedures.

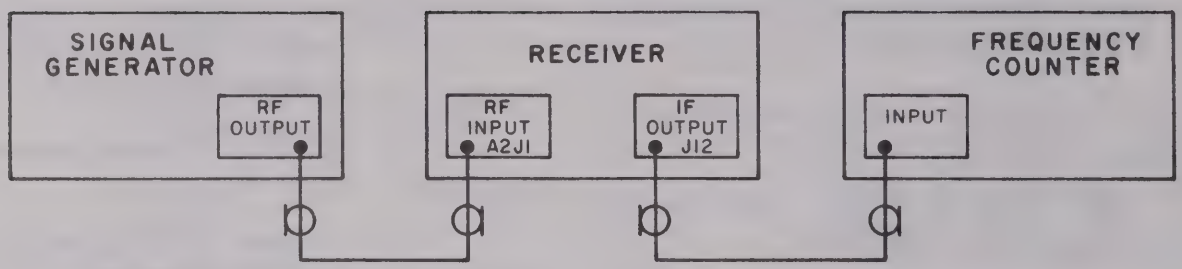


Figure 4-4. Frequency Tuning Performance, Test Setup

CHAPTER 5

TROUBLESHOOTING

5-1. INTRODUCTION. This chapter contains information and procedures for locating malfunctions within the receiver. Troubleshooting instructions are provided for isolating a malfunction, first to a module or the power supply and then for further isolation (within the module or power supply) to the component level. The instructions consist of detailed fault logic diagrams and step-by-step procedures. A troubleshooting index, a protective device index and power distribution and signal flow diagrams are also provided to assist the technician in isolating faults. References are made to schematic diagrams, component location diagrams, and other pertinent data.

5-2. TROUBLESHOOTING INDEX. This index, presented in table 5-1, provides reference to the technician to appropriate procedures used to troubleshoot a specific functional area. It also references functional descriptions and adjustment/alignment information pertinent to the functional areas being investigated.

5-3. PROTECTIVE DEVICE INDEX. This index is presented in table 5-2.

5-4. MAINTENANCE TURN-ON PROCEDURE. To energize the receiver for troubleshooting follow the procedures in table 5-3.

5-5. ACCESS FOR TROUBLESHOOTING. Receiver modules and components are accessed by removing the top and bottom covers and also the front panel following the procedure given in paragraph 6-10. Refer to chapter 7 for location of modules and components. Pc board circuitry may be accessed, while energized, by use of one or both of the extender cards. See paragraph 6-3 for details on extender cards.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

5-6. TROUBLESHOOTING PROCEDURES. Troubleshooting procedures for the receiver include maintenance turn-on, overall troubleshooting, fault isolation to the module level, fault isolation to the component level, repair and adjustment, and post-repair performance checks.

a. Troubleshooting Sequence. The isolation and repair of the receiver can be done in a rapid and accurate manner by following the step-by-step procedures in the following paragraphs (1) through (6).

(1) Perform maintenance turn-on procedure (table 5-3).

(2) Perform receiver overall troubleshooting procedures (figure 5-1) to isolate fault to a functional area.

(3) Troubleshoot functional area to isolate fault to the power supply or a module (figure 5-2 through 5-8).

(4) Troubleshoot power supply or module to isolate fault to component (paragraph 5-6d).

(5) Perform necessary repair and adjustment/alignment in accordance with procedures of chapter 6.

Table 5-1. Troubleshooting Index

Functional area	Trouble-shooting paragraph	Trouble-shooting diagram	Functional description paragraph	Alignment/ adjustment paragraph
Am. detection	5-6n	5-5	3-9, 3-25, 3-28	6-6b and 6-6c
Cw detection	5-6p	5-6, 5-18	3-30 thru 32, 3-43 thru 46	6-6b, 6-6c, 6-6f, 6-7f
Fm detection	5-6p	5-7, 5-19	3-25, 3-27	6-6f
Frequency display	5-6	5-2	3-12d, 3-50	6-8
If. noise output	-	5-4	-	-
If. output	5-6f	5-3	3-9, 3-18 thru 25	6-5, 6-6a thru 6-6d
If. output, usb/lsb	5-6k, 5-6l	5-4	3-12, 3-25 thru 30	6-6d
Line audio output	5-6q	5-17, 5-20	3-28	-
Manual/automatic gain control	5-6m	5-8	3-26	-
Power supply	5-6d	5-9	3-5, 3-13, 3-53	-
Signal-to-noise ratio	5-6g	5-5	3-17	6-5
Tuning performance	5-6r, 5-6s, 5-6u, 5-6v	5-8	3-14, 3-32 thru 51	6-7
Usb/lsb/isb detection	5-6o	5-7	3-25, 3-28 thru 29	6-6d

Table 5-2. Protective Device Index

Reference designation	Rear Panel marking	Rating * volts	Rating * amps	Circuit protected	Troubleshooting diagram (fig no.)
1F1	F1	115	1 (slo blo)	Ac power input	5-9
1F2	F2	115	1 (slo blo)	Ac power input	5-9

* Equipment operated from 230 Vac source requires two 1/2 amp, slo blow fuses.

Table 5-3. Maintenance Turn-on Procedures

Step	Observe	Reference
1. Preliminary procedure. Ensure the power cord is attached and all connectors on the rear panel are secure.	Connections made	-
2. Power on. Depress POWER PUSH ON/OFF switch.	Pushbutton displays red indicator. Frequency display illuminates.	Paragraph 5-6b
3. Functional check. Is the tuning knob operational? If so, receiver is ready for further troubleshooting checks.	Frequency display	Paragraph 5-6b

(6) Verify that repair action remedied the fault by repeating the failed step of the maintenance turn-on procedure.

b. Receiver Overall Troubleshooting. Figure 5-1 is the receiver overall troubleshooting fault logic diagram. This gives the sequence for performing the performance tests detailed in chapter 4. When a fault is detected during this sequence (in a functional area), this diagram indicates the next fault logic diagram to follow to continue troubleshooting. The troubleshooting index, in table 5-1, also indicates the next logic diagram to follow for a fault in a particular functional area. Table 5-1 also indicates the location of pertinent functional descriptions and alignment/adjustment procedures for these areas.

c. Troubleshooting to Power Supply or Module. Figure 5-2 through 5-8 are fault logic diagrams which contain procedures for isolating malfunctions to the power supply or a module. When a fault is isolated to the power supply or module, these diagrams indicate the next procedures to follow to further isolate the fault to the component level. Refer to table 5-1 for location of the pertinent functional descriptions. In addition, the items listed below are provided as aids in fault isolation.

(1) Figure FO-1, sheets 1 through 5, receiver main chassis schematic.

(2) Figure FO-22, sheets 1 through 3, receiver power distribution diagrams.

(3) Figure FO-23, sheets 1 through 3, receiver signal flow diagrams.

(4) Figure FO-1, sheets 2 through 5, receiver control system (on main chassis schematic).

(5) Figure 7-2 and 7-3, receiver, top and bottom views, location of components.

d. Troubleshooting Power Supply and Modules. The following paragraphs contain procedures for testing and troubleshooting the power supply and various modules in the receiver. Checkout procedures are provided to help identify symptoms and verify performance. Fault logic diagrams are provided to guide the technician in tracing signal flow through the power supply and modules. In addition, references to circuit descriptions in chapter 3 and to schematic and component location diagrams are included, as appropriate. When testing or troubleshooting observe the following:

(1) Always allow a full 30 minutes for test equipment warm-up.

(2) Read all test procedures thoroughly before beginning a test.

(3) After repairs are complete, verify correct operation by repeating the appropriate check-out procedure.

e. Power Supply.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is required for this test. Refer to table 1-3 for specifics.

(2) Power supply checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6e(3), below.

(a) Deenergize the receiver.

(b) Connect the common (-) digital voltmeter test lead to the rear panel GND terminal.

(c) Connect the (+) voltmeter test lead to the unregulated dc output at C8.

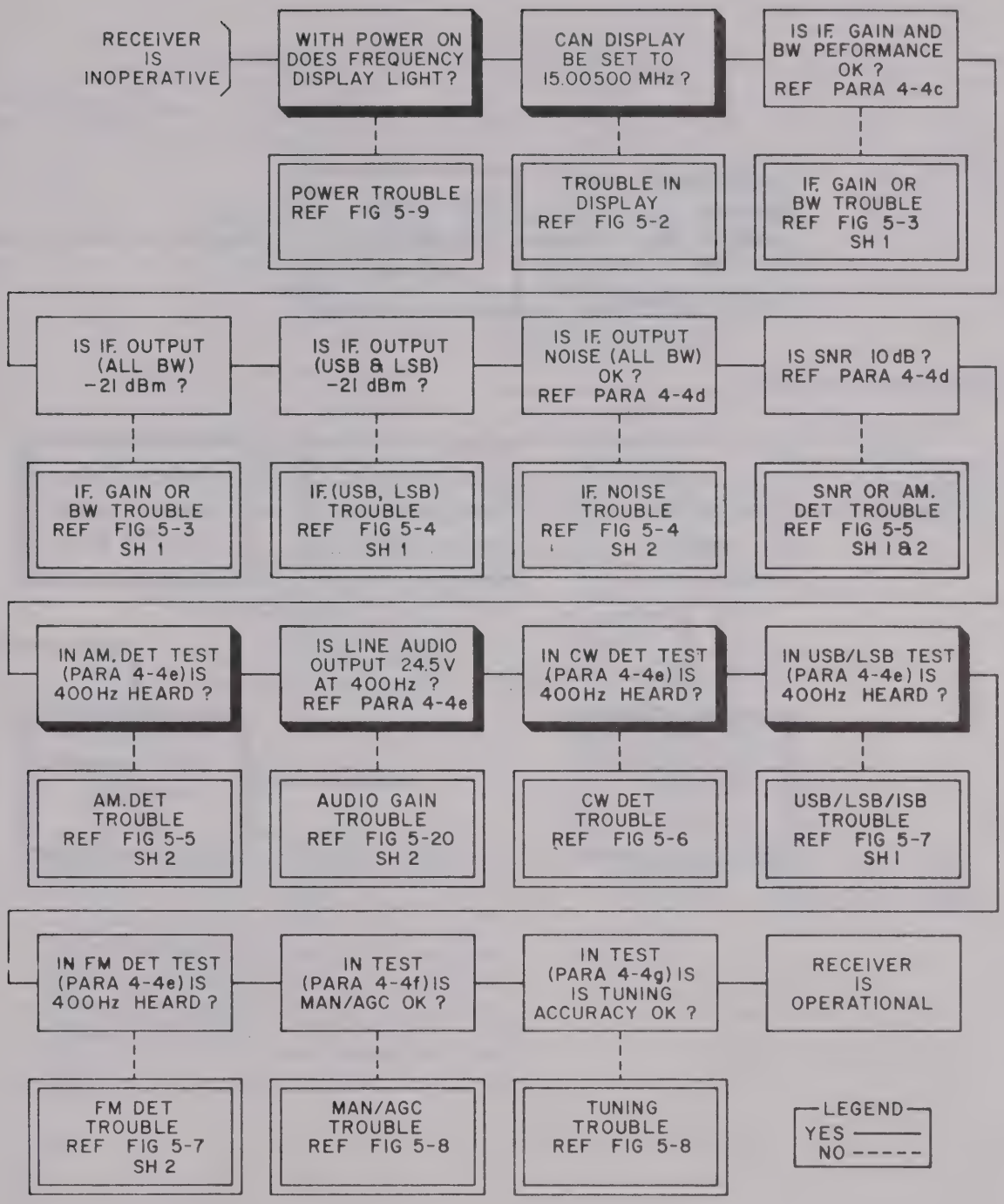

RECEIVER IS INOPERATIVE
WITH POWER ON DOES FREQUENCY DISPLAY LIGHT?
CAN DISPLAY BE SET TO 15.00500 MHz?
IS IF GAIN AND BW PEFORMANCE OK? REF PARA 4-4c
POWER TROUBLE REF FIG 5-9
TROUBLE IN DISPLAY REF FIG 5-2
IF GAIN OR BW TROUBLE REF FIG 5-3 SH 1
IS IF OUTPUT (ALL BW) -21 dBm?
IS IF OUTPUT (USB & LSB) -21 dBm?
IS IF OUTPUT NOISE (ALL BW) OK? REF PARA 4-4d
IS SNR 10dB? REF PARA 4-4d
IF GAIN OR BW TROUBLE REF FIG 5-3 SH 1
IF (USB, LSB) TROUBLE REF FIG 5-4 SH 1
IF NOISE TROUBLE REF FIG 5-4 SH 2
SNR OR AM. DET TROUBLE REF FIG 5-5 SH 1&2
IN AM. DET TEST (PARA 4-4e) IS 400Hz HEARD?
IS LINE AUDIO OUTPUT 24.5V AT 400Hz? REF PARA 4-4e
IN CW DET TEST (PARA 4-4e) IS 400Hz HEARD?
IN USB/LSB TEST (PARA 4-4e) IS 400Hz HEARD?
AM. DET TROUBLE REF FIG 5-5 SH 2
AUDIO GAIN TROUBLE REF FIG 5-20 SH 2
CW DET TROUBLE REF FIG 5-6
USB/LSB/ISB TROUBLE REF FIG 5-7 SH 1
IN FM DET TEST (PARA 4-4e) IS 400Hz HEARD?
IN TEST (PARA 4-4f) IS MAN/AGC OK?
IN TEST (PARA 4-4g) IS IS TUNING ACCURACY OK?
RECEIVER IS OPERATIONAL
FM DET TROUBLE REF FIG 5-7 SH 2
MAN/AGC TROUBLE REF FIG 5-8
TUNING TROUBLE REF FIG 5-8
LEGEND
YES
NO

Figure 5-1. Receiver Overall Troubleshooting Fault Logic Diagram

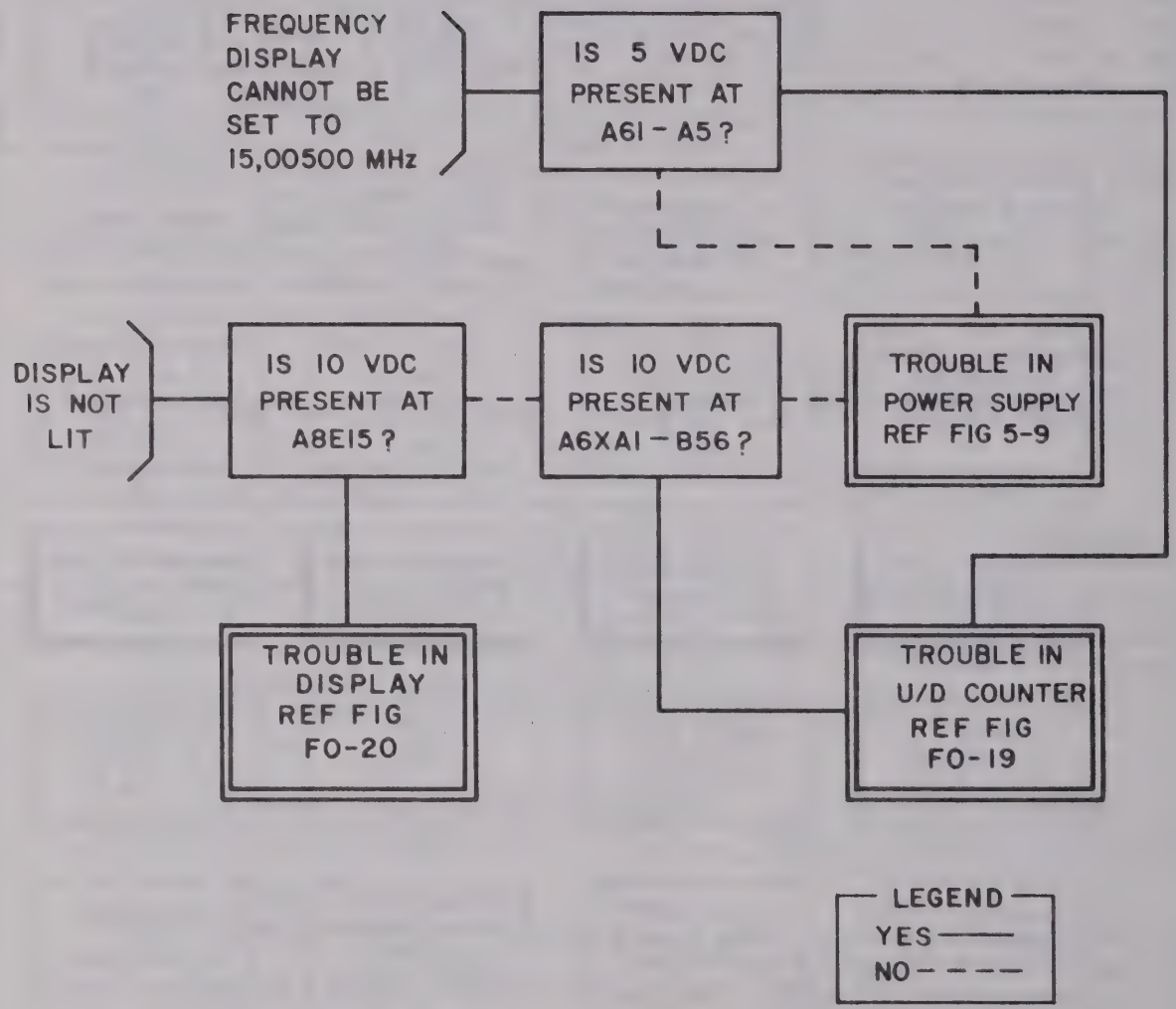

FREQUENCY DISPLAY CANNOT BE SET TO 15,00500 MHz
IS 5 VDC PRESENT AT A61 - A5 ?
DISPLAY IS NOT LIT
IS 10 VDC PRESENT AT A8E15 ?
IS 10 VDC PRESENT AT A6XA1 - B56 ?
TROUBLE IN POWER SUPPLY REF FIG 5-9
TROUBLE IN DISPLAY REF FIG FO-20
TROUBLE IN U/D COUNTER REF FIG FO-19
LEGEND
YES
NO

Figure 5-2. Frequency Display Fault Logic Diagram

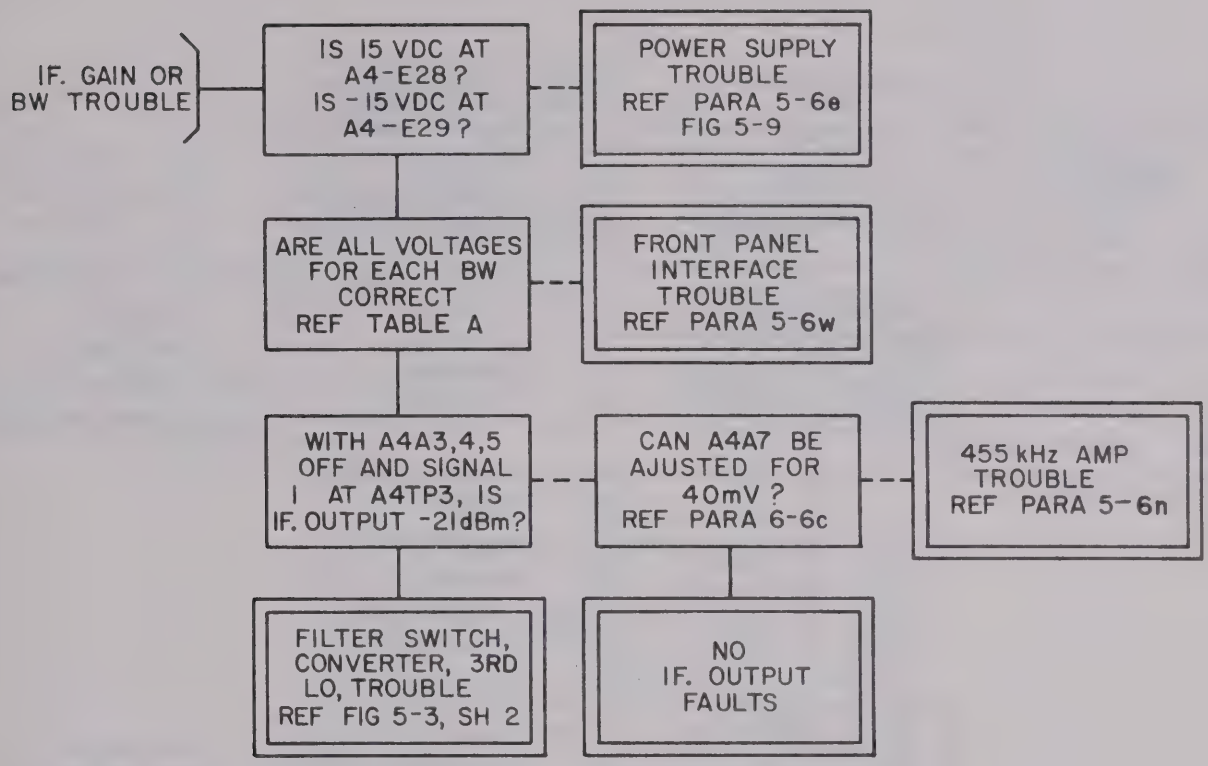

IF. GAIN OR BW TROUBLE
IS 15 VDC AT A4-E28 ? IS -15 VDC AT A4-E29 ?
POWER SUPPLY TROUBLE REF PARA 5-6e FIG 5-9
ARE ALL VOLTAGES FOR EACH BW CORRECT REF TABLE A
FRONT PANEL INTERFACE TROUBLE REF PARA 5-6w
WITH A4A3,4,5 OFF AND SIGNAL 1 AT A4TP3, IS IF. OUTPUT -21dBm?
CAN A4A7 BE AJUSTED FOR 40mV ? REF PARA 6-6c
455 kHz AMP TROUBLE REF PARA 5-6n
FILTER SWITCH, CONVERTER, 3RD LO, TROUBLE REF FIG 5-3, SH 2
NO IF. OUTPUT FAULTS

TABLE A BW SWITCHING VOLTAGE

PIN**	16 kHz	6 kHz	3 kHz	1 kHz	.3 kHz
A1-15	+5	0	0	0	0
A1-17	0	+5	0	0	0
A1-19	0	0	+5	+5	+5
A3-15	+5	+5	+5	0	0
A3-17	0	0	0	+5	0
A3-19	0	0	0	0	+5

SIGNALS

1 = 455 kHz UNMOD AT -75 dBm

2 = 455 kHz UNMOD AT -84 dBm

LEGEND

YES ———

NO - - - -

Figure 5-3. If. Output Fault Logic Diagram (Sheet 1 of 3)

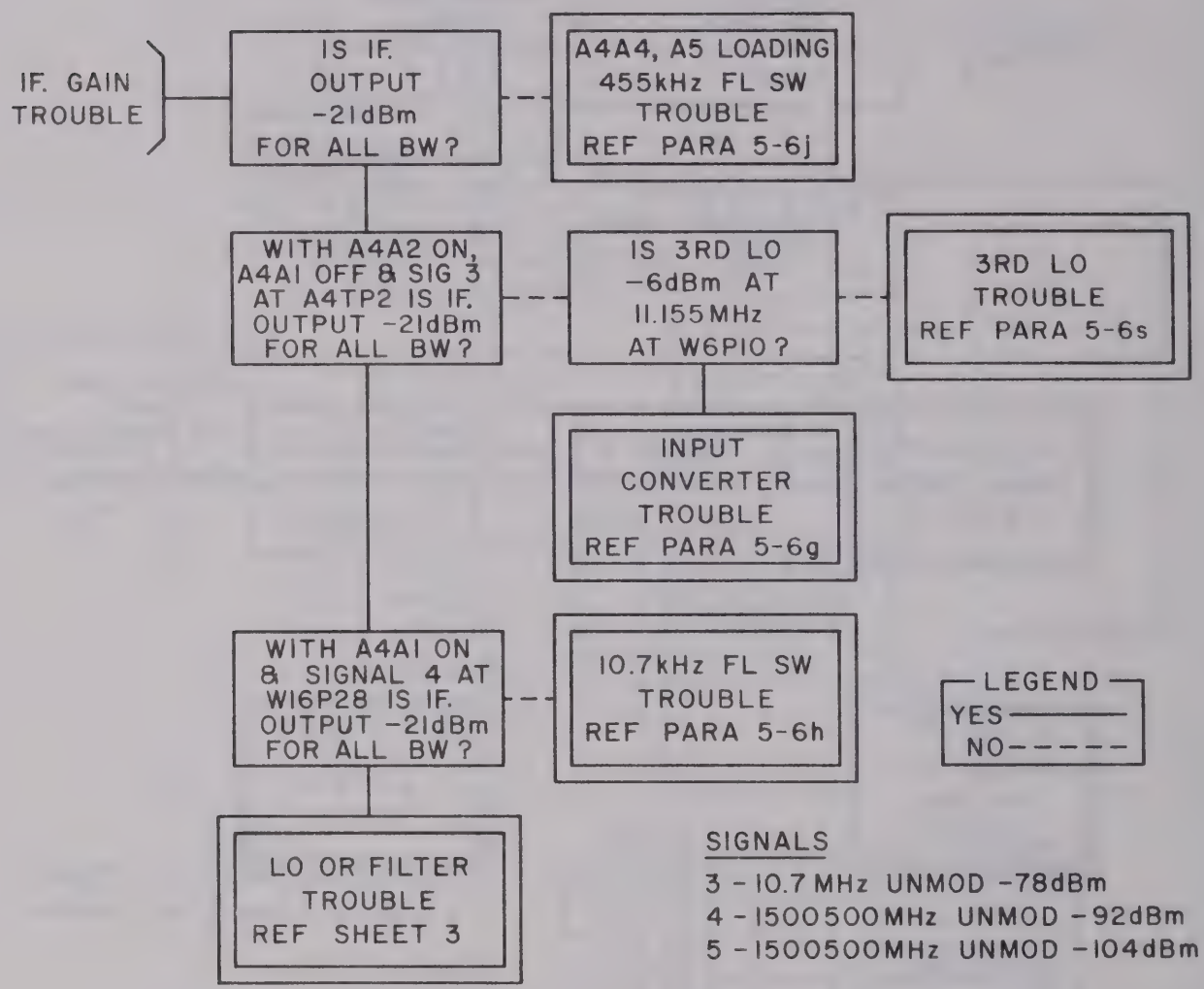

IF. GAIN TROUBLE
IS IF. OUTPUT -21dBm FOR ALL BW?
A4A4, A5 LOADING 455kHz FL SW TROUBLE REF PARA 5-6j
WITH A4A2 ON, A4A1 OFF & SIG 3 AT A4TP2 IS IF. OUTPUT -21dBm FOR ALL BW?
IS 3RD LO -6dBm AT 11.155MHz AT W6P10?
3RD LO TROUBLE REF PARA 5-6s
INPUT CONVERTER TROUBLE REF PARA 5-6g
WITH A4A1 ON & SIGNAL 4 AT W16P28 IS IF. OUTPUT -21dBm FOR ALL BW?
10.7kHz FL SW TROUBLE REF PARA 5-6h
LEGEND
YES
NO
LO OR FILTER TROUBLE REF SHEET 3
SIGNALS
3 - 10.7 MHz UNMOD -78dBm
4 - 1500500MHz UNMOD -92dBm
5 - 1500500MHz UNMOD -104dBm

Figure 5-3. If. Output Fault Logic Diagram (Sheet 2 of 3)

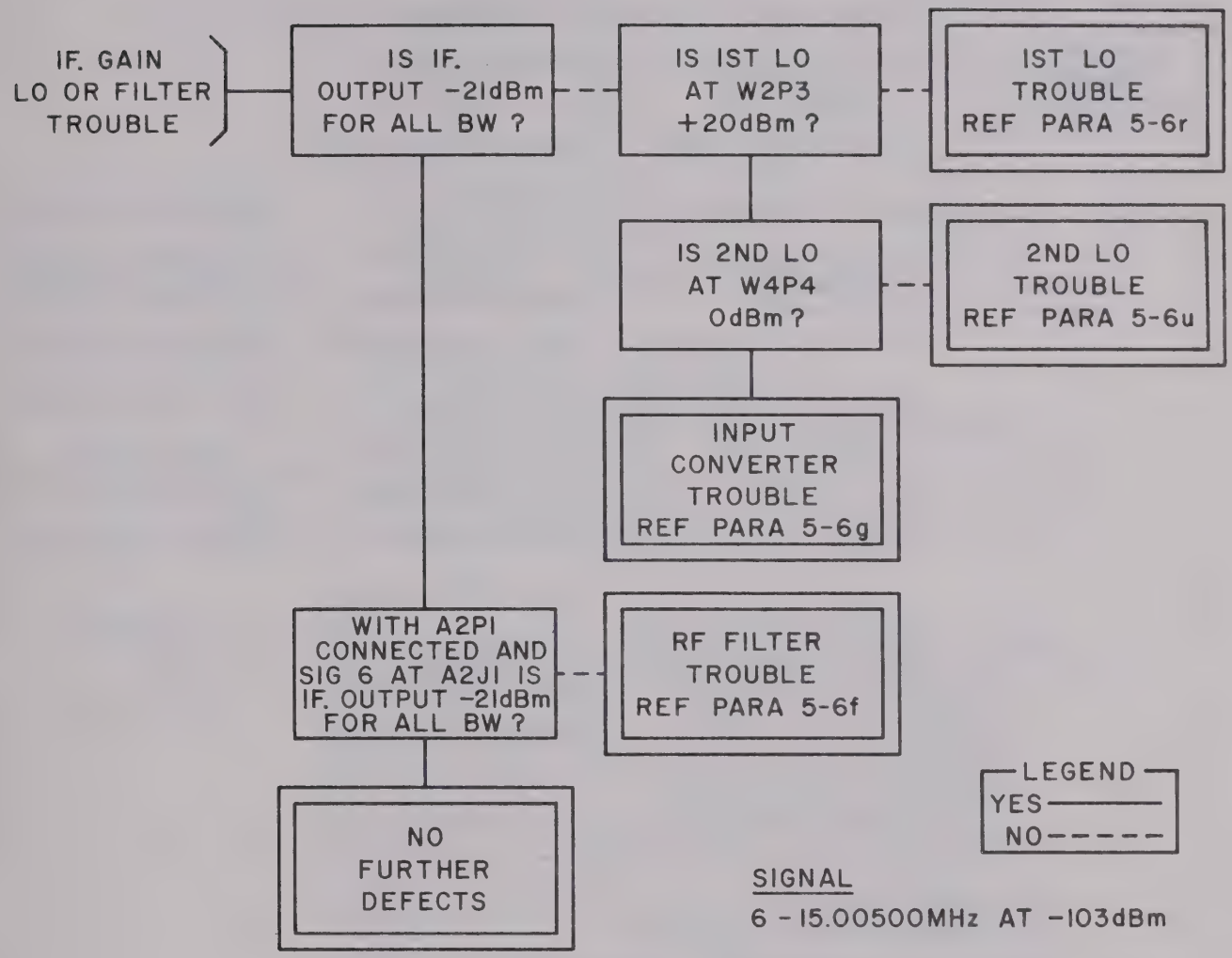


Figure 5-3. If. Output Fault Logic Diagram (Sheet 3 of 3)

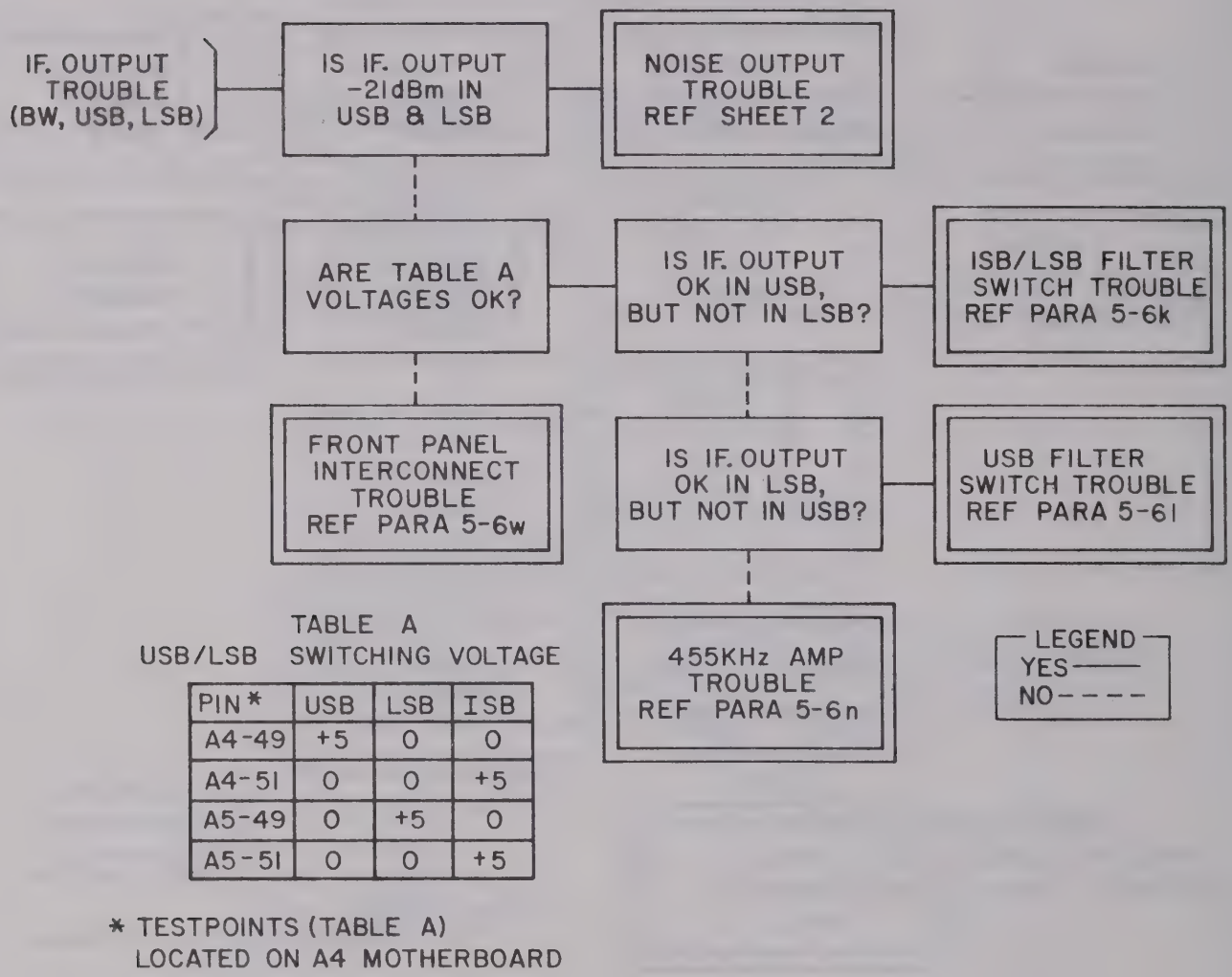

IF. OUTPUT TROUBLE (BW, USB, LSB)
IS IF. OUTPUT -21dBm IN USB & LSB
NOISE OUTPUT TROUBLE REF SHEET 2
ARE TABLE A VOLTAGES OK?
IS IF. OUTPUT OK IN USB, BUT NOT IN LSB?
ISB/LSB FILTER SWITCH TROUBLE REF PARA 5-6k
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
IS IF. OUTPUT OK IN LSB, BUT NOT IN USB?
USB FILTER SWITCH TROUBLE REF PARA 5-6l
455KHz AMP TROUBLE REF PARA 5-6n
LEGEND
YES
NO

TABLE A
USB/LSB SWITCHING VOLTAGE

PIN*	USB	LSB	ISB
A4-49	+5	0	0
A4-51	0	0	+5
A5-49	0	+5	0
A5-51	0	0	+5

* TESTPOINTS (TABLE A) LOCATED ON A4 MOTHERBOARD

Figure 5-4. If. Output, Usb/Lsb, Fault Logic Diagram (Sheet 1 of 2)

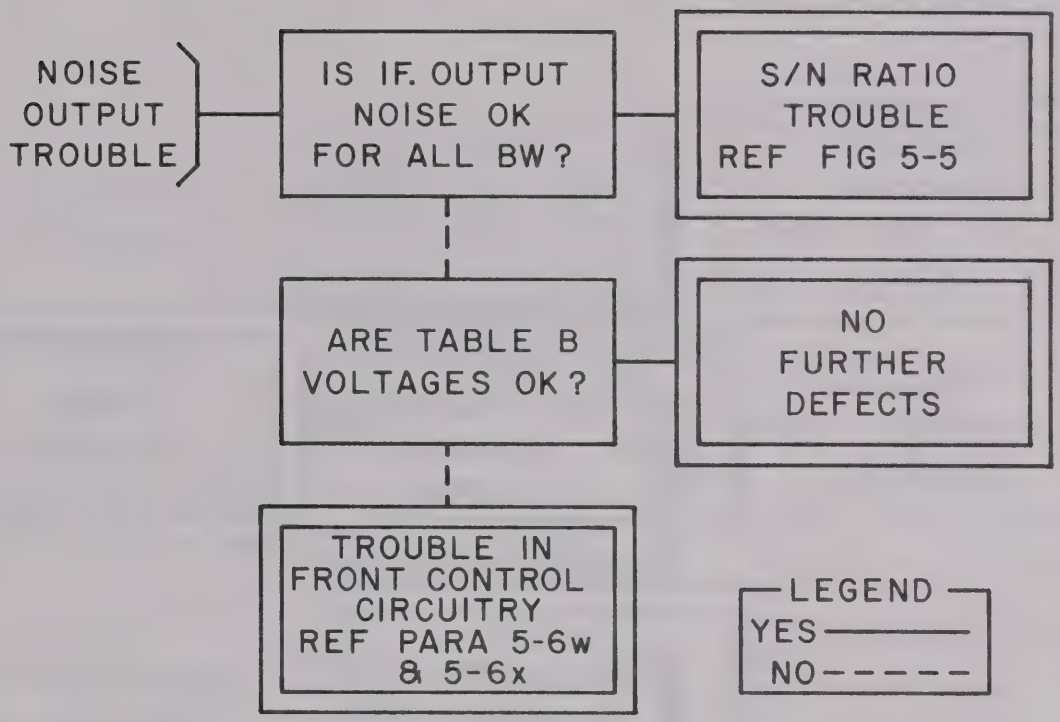

NOISE OUTPUT TROUBLE
IS IF. OUTPUT NOISE OK FOR ALL BW?
S/N RATIO TROUBLE REF FIG 5-5
ARE TABLE B VOLTAGES OK?
NO FURTHER DEFECTS
TROUBLE IN FRONT CONTROL CIRCUITRY REF PARA 5-6w & 5-6x
LEGEND
YES
NO

TABLE B BW SWITCHING VOLTAGE

PIN NO	16kHz	6kHz	3kHz	1kHz	.3kHz
A1-15	+5	0	0	0	0
A1-17	0	+5	0	0	0
A1-19	0	0	+5	+5	+5
A3-15	+5	+5	+5	0	0
A3-17	0	0	0	+5	0
A3-19	0	0	0	0	+5

NOTE: TO RESOLVE INCORRECT VOLTAGE LEVELS, TROUBLESHOOT FRONT PANEL INTERCONNECT OR LOWER PANEL CONTROL.

Figure 5-4. If. Output, Usb/Lsb, Fault Logic Diagram (Sheet 2 of 2)

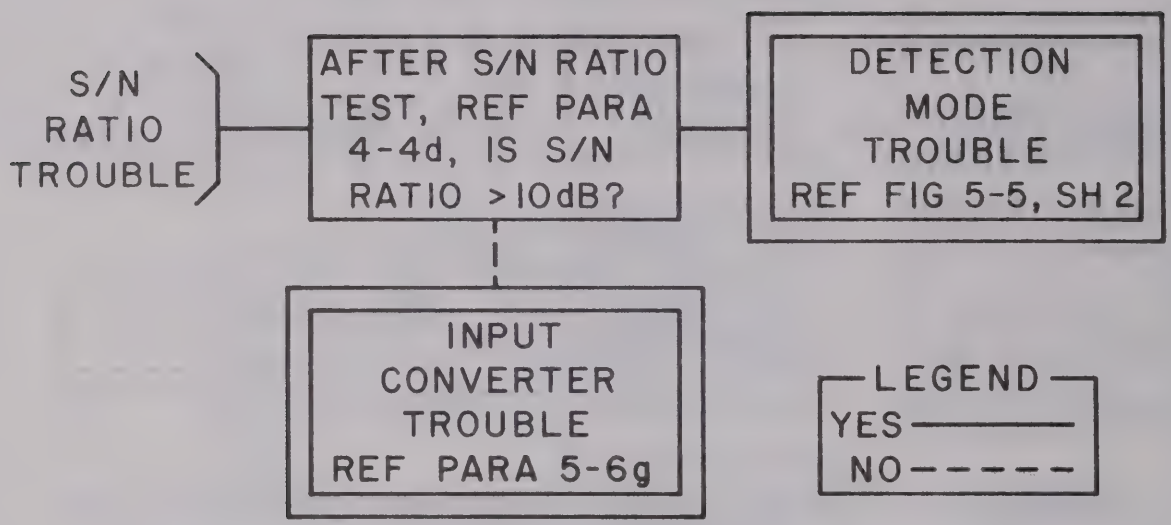


Figure 5-5. Signal-to-noise Ratio and Am. Detection
Fault Logic Diagram (Sheet 1 of 3)

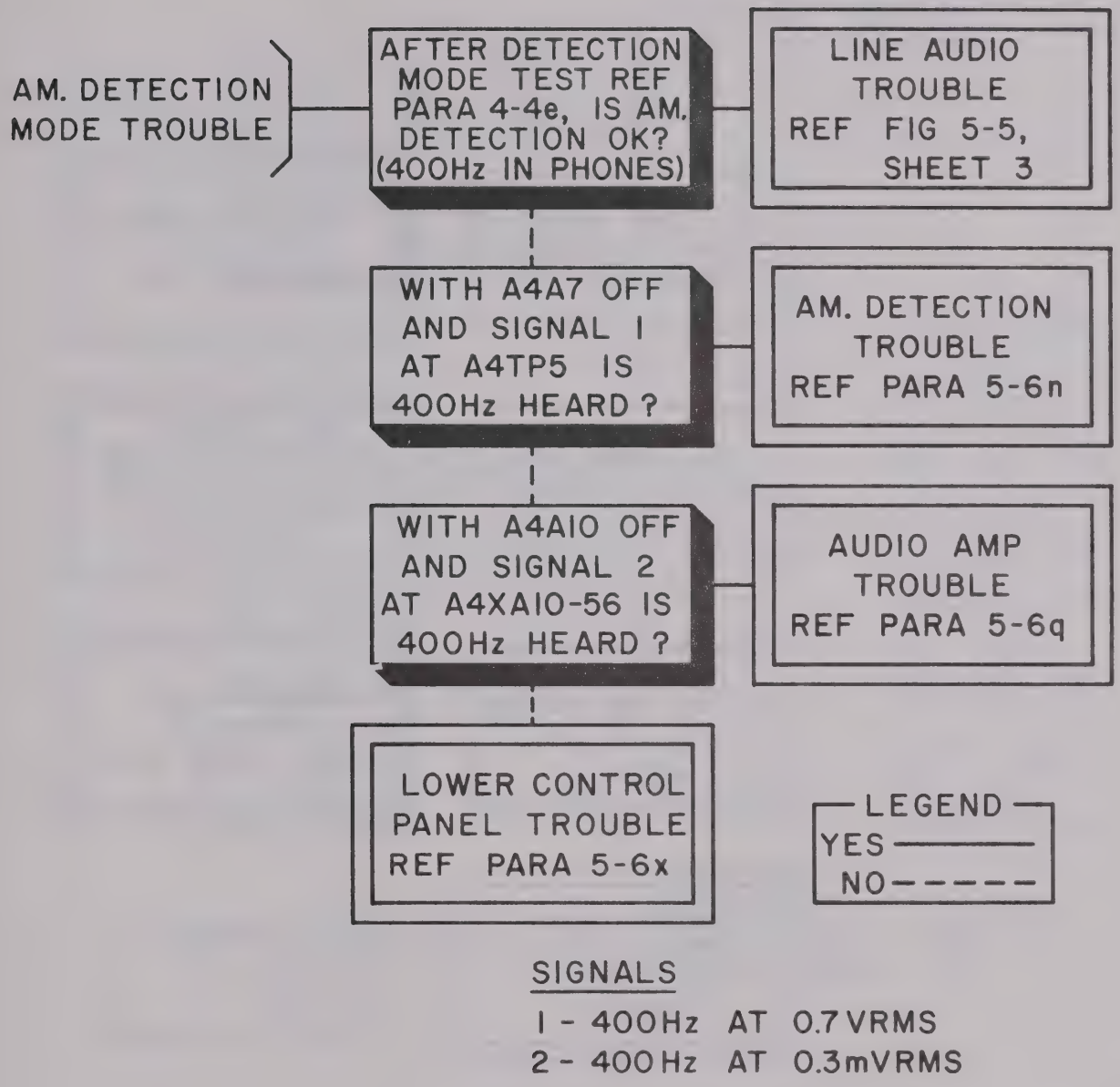

AM. DETECTION MODE TROUBLE
AFTER DETECTION MODE TEST REF PARA 4-4e, IS AM. DETECTION OK? (400Hz IN PHONES)
LINE AUDIO TROUBLE REF FIG 5-5, SHEET 3
WITH A4A7 OFF AND SIGNAL 1 AT A4TP5 IS 400Hz HEARD ?
AM. DETECTION TROUBLE REF PARA 5-6n
WITH A4A10 OFF AND SIGNAL 2 AT A4XA10-56 IS 400Hz HEARD ?
AUDIO AMP TROUBLE REF PARA 5-6q
LOWER CONTROL PANEL TROUBLE REF PARA 5-6x
LEGEND
YES
NO
SIGNALS
1 - 400Hz AT 0.7VRMS
2 - 400Hz AT 0.3mVRMS

Figure 5-5. Signal-to-noise Ratio and Am: Detection Fault Logic Diagram (Sheet 2 of 3)

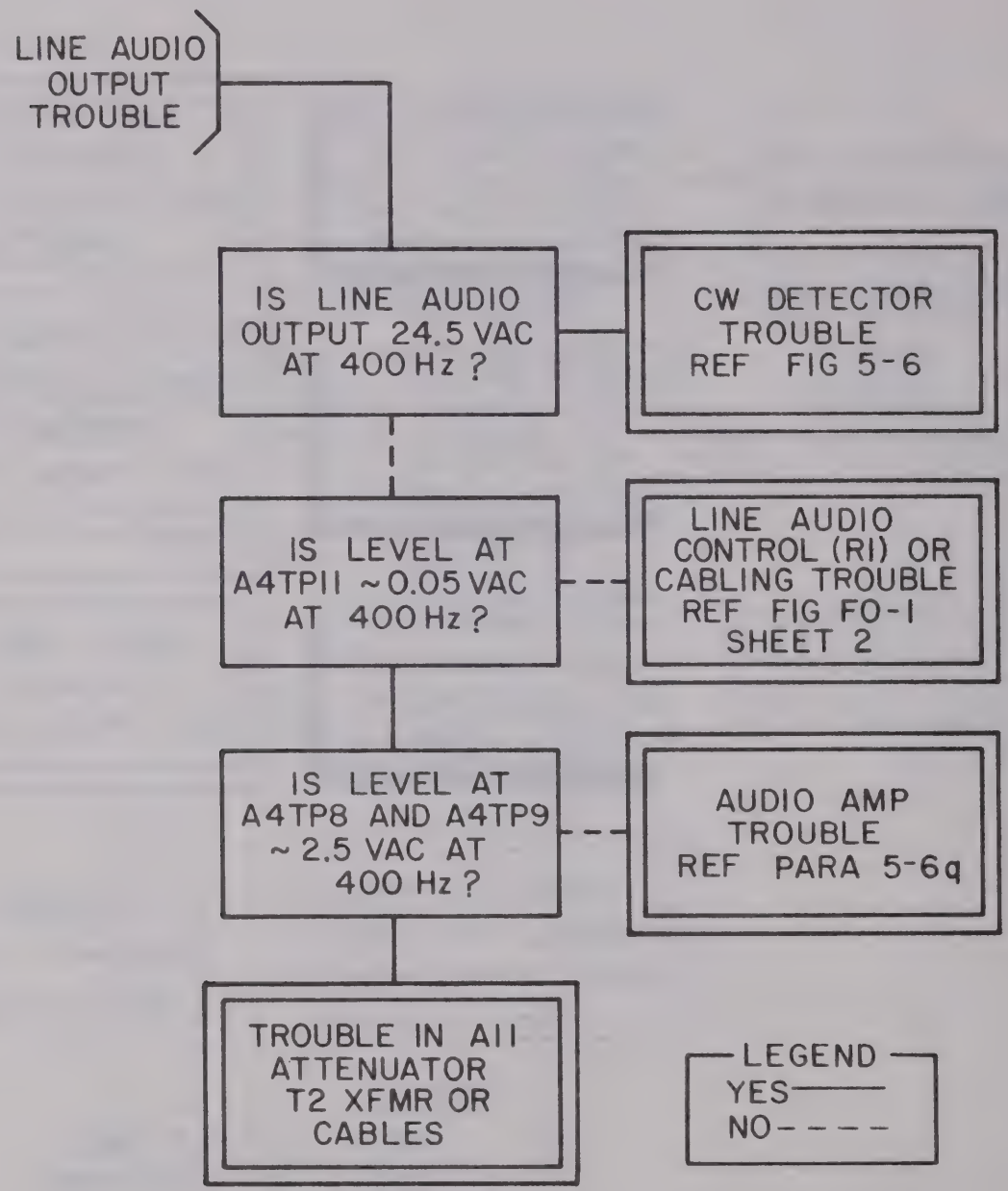

LINE AUDIO OUTPUT TROUBLE
IS LINE AUDIO OUTPUT 24.5 VAC AT 400 Hz ?
CW DETECTOR TROUBLE REF FIG 5-6
IS LEVEL AT A4TP11 ~0.05 VAC AT 400 Hz ?
LINE AUDIO CONTROL (R1) OR CABLING TROUBLE REF FIG FO-1 SHEET 2
IS LEVEL AT A4TP8 AND A4TP9 ~2.5 VAC AT 400 Hz ?
AUDIO AMP TROUBLE REF PARA 5-6q
TROUBLE IN A11 ATTENUATOR T2 XFMR OR CABLES
LEGEND
YES
NO

Figure 5-5. Signal-to-noise Ratio and Am. Detection Fault Logic Diagram (Sheet 3 of 3)

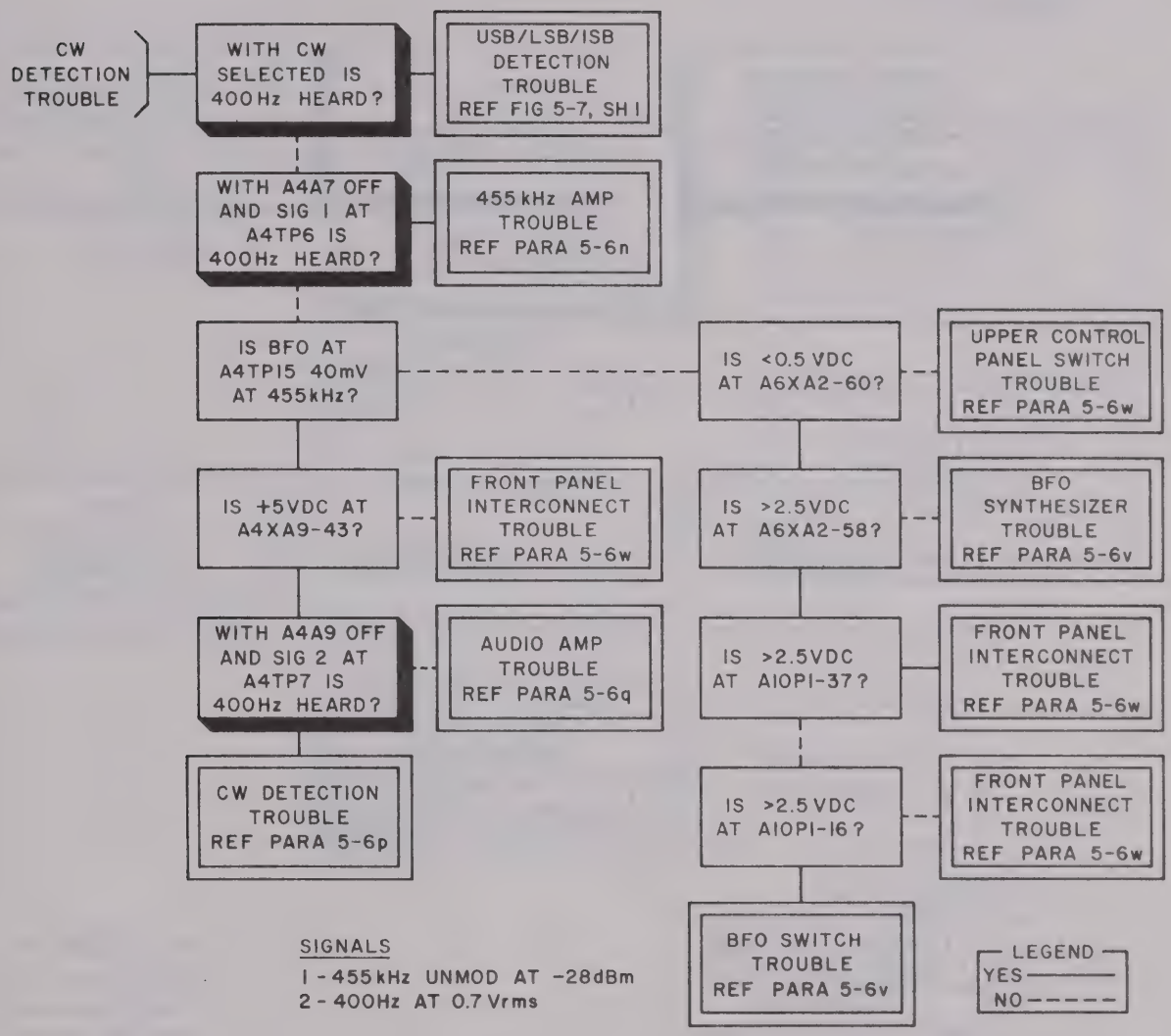


Figure 5-6. Cw Detection Fault Logic Diagram

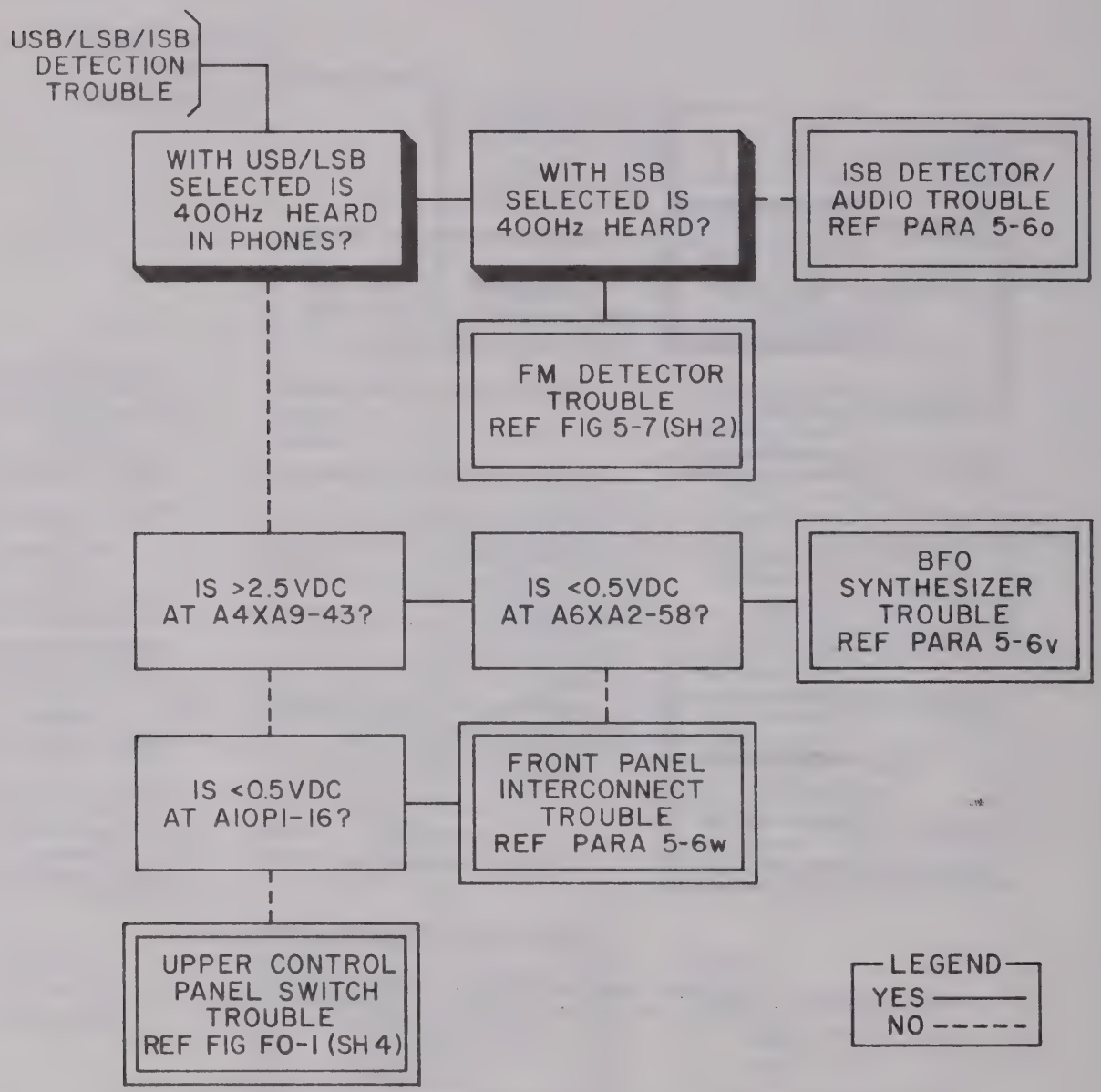

USB/LSB/ISB DETECTION TROUBLE
WITH USB/LSB SELECTED IS 400Hz HEARD IN PHONES?
WITH ISB SELECTED IS 400Hz HEARD?
ISB DETECTOR/ AUDIO TROUBLE REF PARA 5-6o
FM DETECTOR TROUBLE REF FIG 5-7 (SH 2)
IS >2.5VDC AT A4XA9-43?
IS <0.5VDC AT A6XA2-58?
BFO SYNTHESIZER TROUBLE REF PARA 5-6v
IS <0.5VDC AT A1OP1-16?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
UPPER CONTROL PANEL SWITCH TROUBLE REF FIG FO-1 (SH 4)
LEGEND
YES
NO

Figure 5-7. Fm, Usb/Lsb/Isb Detection
Fault Logic Diagram (Sheet 1 of 2)

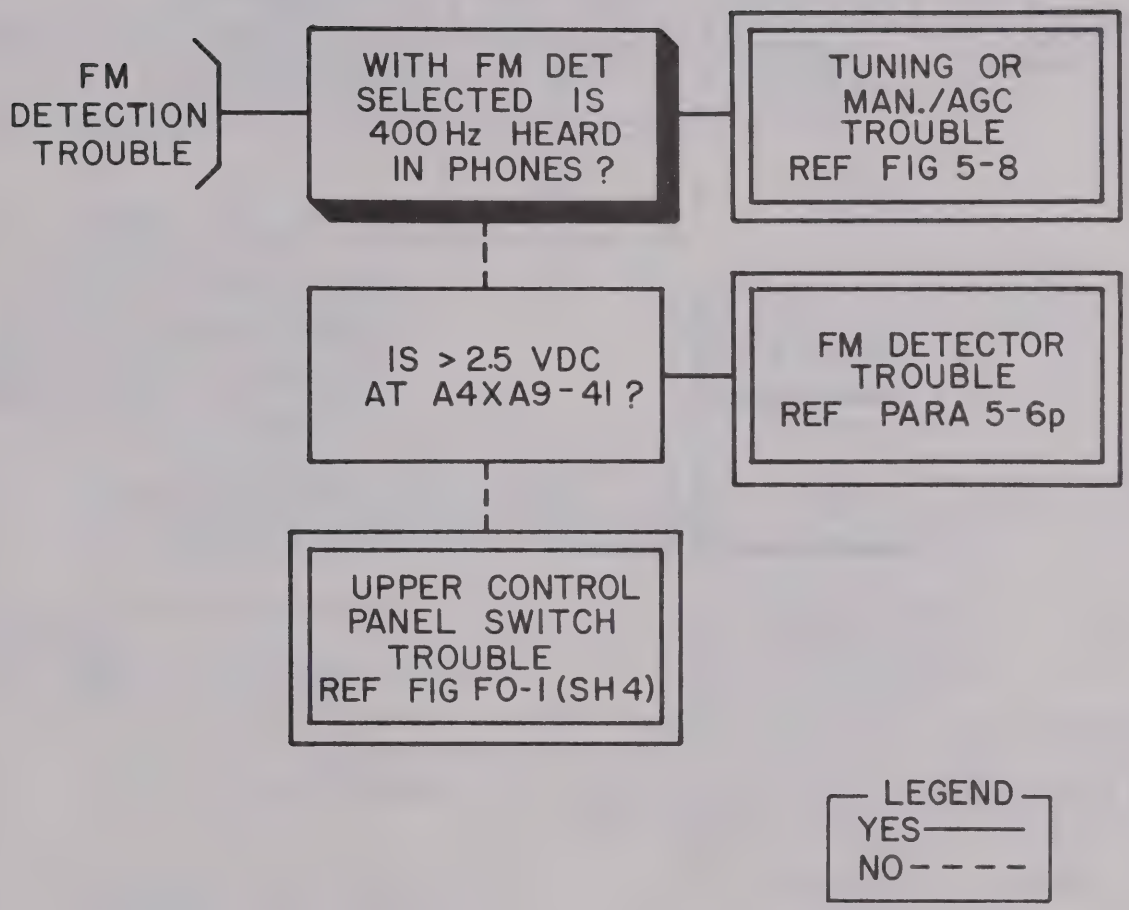

FM DETECTION TROUBLE
WITH FM DET SELECTED IS 400 Hz HEARD IN PHONES ?
TUNING OR MAN./AGC TROUBLE REF FIG 5-8
IS > 2.5 VDC AT A4XA9-41 ?
FM DETECTOR TROUBLE REF PARA 5-6p
UPPER CONTROL PANEL SWITCH TROUBLE REF FIG FO-1 (SH 4)
LEGEND
YES
NO

Figure 5-7. Fm, Usb/Lsb/Isb Detection
Fault Logic Diagram (Sheet 2 of 2)

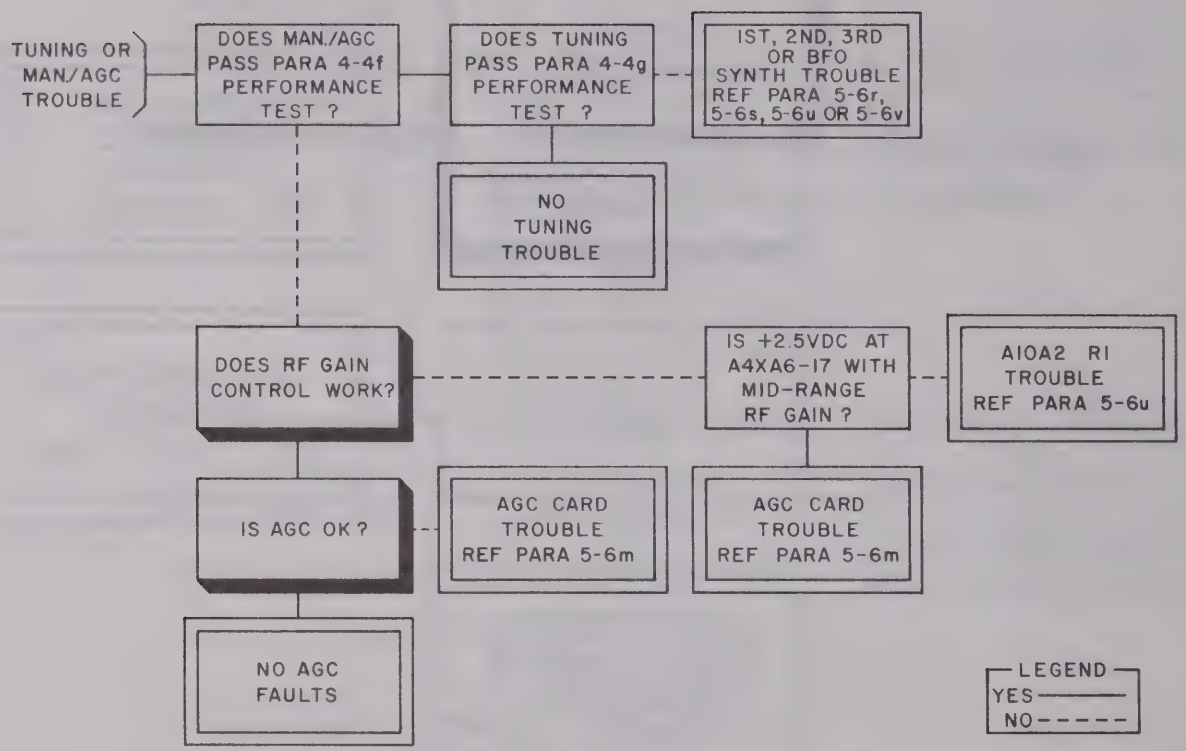

TUNING OR MAN/AGC TROUBLE
DOES MAN./AGC PASS PARA 4-4f PERFORMANCE TEST ?
DOES TUNING PASS PARA 4-4g PERFORMANCE TEST ?
1ST, 2ND, 3RD OR BFO SYNTH TROUBLE REF PARA 5-6r, 5-6s, 5-6u OR 5-6v
NO TUNING TROUBLE
DOES RF GAIN CONTROL WORK?
IS +2.5VDC AT A4XA6-17 WITH MID-RANGE RF GAIN ?
A1OA2 R1 TROUBLE REF PARA 5-6u
IS AGC OK ?
AGC CARD TROUBLE REF PARA 5-6m
AGC CARD TROUBLE REF PARA 5-6m
NO AGC FAULTS
LEGEND
YES
NO

Figure 5-8. Manual/Automatic Gain Control and Tuning Performance Logic Diagram

(d) Set the voltmeter to the 200 Vdc range.

(e) Energize the receiver. The voltmeter should indicate at least +22 Vdc.

(f) Deenergize the receiver.

(g) Connect the (+) voltmeter test lead to test point E1.

(h) Set the voltmeter to the 20 Vdc range.

(i) Energize the receiver. The voltmeter should indicate +15 Vdc ±0.75 Vdc.

(j) Deenergize the receiver.

(k) Connect the (+) voltmeter test lead to test point E2.

(l) Energize the receiver. The voltmeter should indicate -15 Vdc ±0.75 Vdc.

(m) Deenergize the receiver.

(n) Connect the (+) voltmeter test lead to test point E3.

(o) Energize the receiver. The voltmeter should indicate at least +10 Vdc.

(p) Deenergize the receiver and disconnect the test equipment.

(3) Power Supply Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the power supply for normal operation by repeating the checkout procedure above.

(a) Figure 5-9, power supply fault logic diagram.

(b) Figure FO-1, sheet 1, main chassis schematic diagram.

(c) Power supply circuit description, paragraph 3-53.

(d) Figure 7-4, power distribution, location of components.

(e) Parts replacement guidelines, chapter 6, section II.

f. Rf Filter (A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Rf voltmeter
(c) Digital voltmeter

(2) Rf filter checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6f(3), below:

(a) Deenergize the receiver.

(b) Disconnect A2P1 from A3A1J1 on the input converter.

(c) Connect the rf voltmeter and 50-ohm adapter to A2P1.

(d) Connect the output of the signal generator to A2J1 on the rear panel of the receiver.

(e) Set the rf voltmeter to the 0 dBm range.

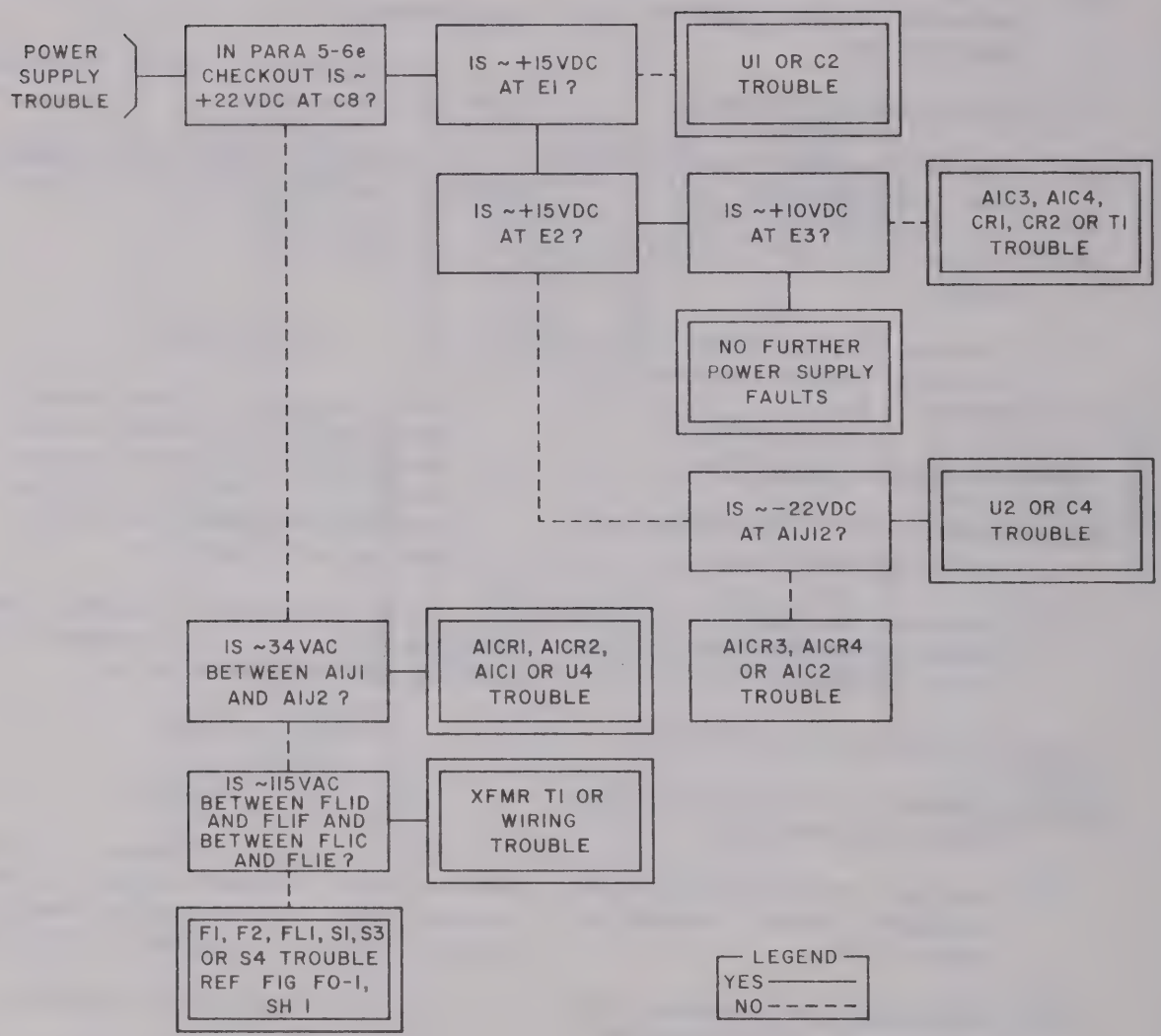

POWER SUPPLY TROUBLE
IN PARA 5-6e CHECKOUT IS ~ +22VDC AT C8?
IS ~+15VDC AT E1?
U1 OR C2 TROUBLE
IS ~+15VDC AT E2?
IS ~+10VDC AT E3?
AIC3, AIC4, CR1, CR2 OR T1 TROUBLE
NO FURTHER POWER SUPPLY FAULTS
IS ~-22VDC AT A1J12?
U2 OR C4 TROUBLE
IS ~34VAC BETWEEN A1J1 AND A1J2?
A1CR1, A1CR2, A1C1 OR U4 TROUBLE
A1CR3, A1CR4 OR A1C2 TROUBLE
IS ~115VAC BETWEEN FL1D AND FL1F AND BETWEEN FL1C AND FL1E?
XFMR T1 OR WIRING TROUBLE
F1, F2, FL1, S1, S3 OR S4 TROUBLE REF FIG FO-1, SH 1
LEGEND
YES
NO

Figure 5-9. Power Supply Fault Logic Diagram

(f) Set the signal generator output frequency to 1.0 MHz and output level to 0 dBm.

(g) The rf voltmeter should indicate a level between 0 dBm and -1.0 dBm.

(h) Tune the signal generator to 10 MHz, 20 MHz, and 30 MHz successively, maintaining the output level at 0 dBm for each frequency. The filter output level should not be less than -1.0 dBm for each frequency.

(i) Disconnect the test equipment from the receiver.

(j) Reconnect A2P1 to A3A1J1.

(3) Rf filter fault isolation.

(a) Deenergize the receiver.

(b) Remove the filter from the receiver and remove the filter's protective cover.

(c) Using the digital voltmeter check all capacitors and the two zener diodes for leakage to ground. (See figure F O-2).

(d) Check all inductors for continuity.

g. Input Converter (A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope

(2) Input converter checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6g(3), below.

(a) Deenergize the receiver.

(b) Disconnect A2P1 from A3A1J1 and P28 from A3A2J2.

(c) Set the receiver front panel controls as follows:

1 GAIN MODE-MAN
2 RF GAIN fully clockwise

NOTE

A yellow indicator will appear in pushbutton when depressed.

(d) Connect the oscilloscope to connector A3A2J2 using a short coaxial cable.

(e) Connect the signal generator to connector A3A1J1 using a short coaxial cable.

(f) Set the generator output frequency to 15.00500 MHz and output level to -10 dBm.

(g) Energize the receiver and tune to 15.00500 MHz.

(h) The oscilloscope should display a level of appx. 3V p-p at appx. 10.7 MHz. The waveform should be a clean sine wave.

(i) Deenergize the receiver and disconnect the test equipment.

(3) Input converter fault isolation. The items listed below are provided as an

aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the input converter for normal operation by repeating the checkout procedure above.

(a) Figure 5-10, input converter fault logic diagram.

(b) Table 5-4, input converter voltage.

(c) Figure FO-3, input converter schematic diagram.

(d) Input converter circuit description, paragraph 3-17.

(e) Figure 7-7, input converter, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

(g) Input converter alignment, paragraph 6-5.

h. 10.7 MHz Filter Switch (A4A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clipleads on one end (2).

(2) 10.7 MHz filter switch checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6h(3), below.

(a) Deenergize the receiver.

(b) Disconnect connector P19 from A4XA1.

(c) Remove pc card A4A2.

(d) Depress the IF BANDWIDTH kHz-3.2 pushbutton.

(e) Connect the oscilloscope to A4XA1 pin 57 (TP2) using a short coaxial cable with clip leads on one end.

(f) Connect the signal generator to A4XA1 pin 13 (TP1) using a short coaxial cable with clip leads on one end.

(g) Set the generator output frequency to 10.7 MHz and output level to -40 dBm.

(h) Energize the receiver. The oscilloscope should display a level of appx. 30 millivolts p-p at appx. 10.7 MHz. The waveform should be a clean sine wave.

(i) Depress the IF BANDWIDTH kHz-6 pushbutton and then the 16 pushbutton. The oscilloscope should display appx. 30 millivolts p-p at appx. 10.7 MHz for both bandwidth positions.

(j) Deenergize the receiver and disconnect the test equipment.

(k) Reinstall pc card A4A2 in its proper slot.

(3) 10.7 MHz filter switch fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the

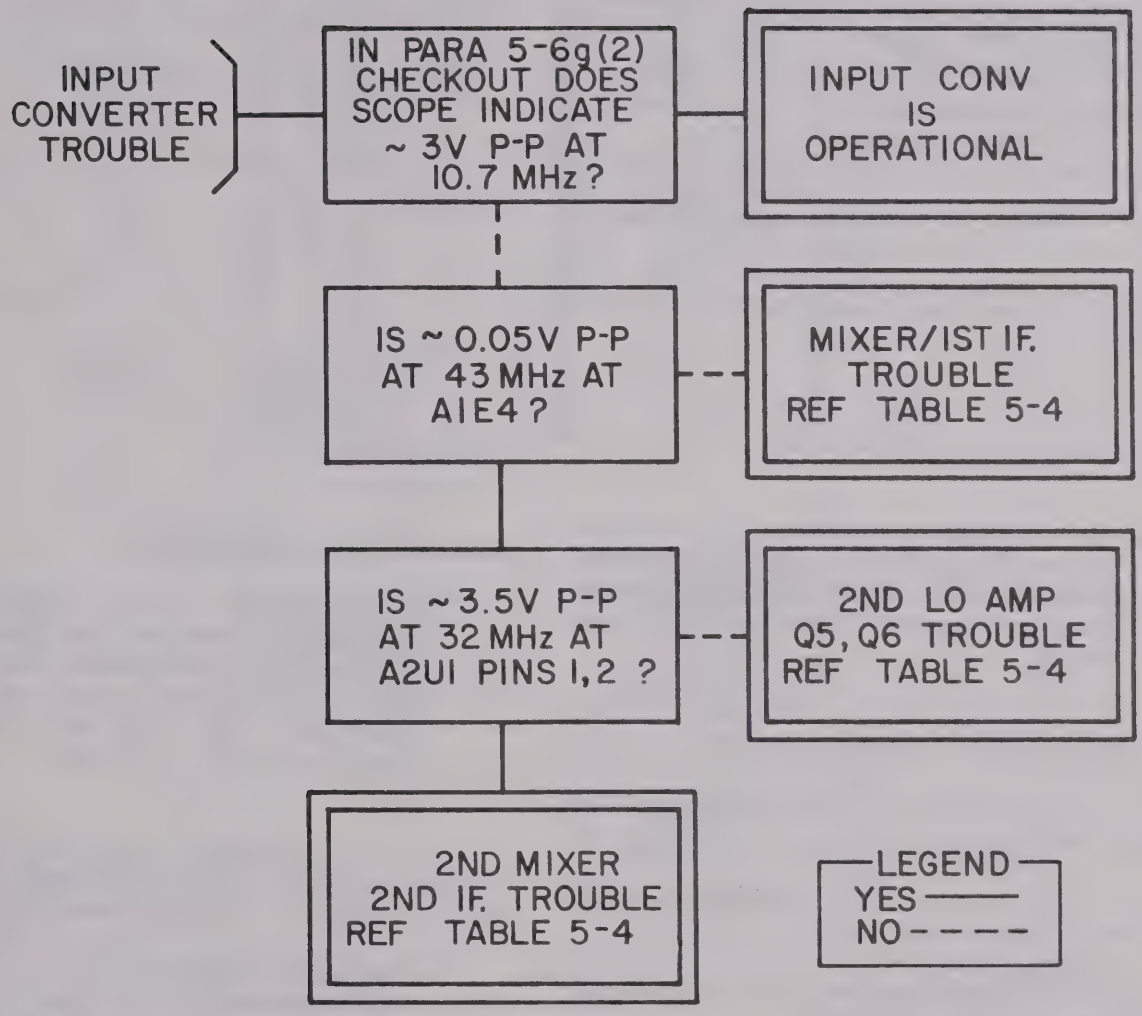

INPUT CONVERTER TROUBLE
IN PARA 5-6g(2) CHECKOUT DOES SCOPE INDICATE ~ 3V P-P AT 10.7 MHz ?
INPUT CONV IS OPERATIONAL
IS ~ 0.05V P-P AT 43 MHz AT A1E4 ?
MIXER/1ST IF. TROUBLE REF TABLE 5-4
IS ~ 3.5V P-P AT 32 MHz AT A2U1 PINS 1,2 ?
2ND LO AMP Q5, Q6 TROUBLE REF TABLE 5-4
2ND MIXER 2ND IF. TROUBLE REF TABLE 5-4
LEGEND
YES
NO

Figure 5-10. Input Converter Fault Logic Diagram

Table 5-4. Input Converter Voltage

Transistor	Pin	Voltage	Transistor	Pin	Voltage
A1Q1	E	+ 0.45	A2Q3	E	+ 8
	B	+ 1.1		B	+ 8.8
	C	+ 3.2		C	+ 14
A1Q2	S	+ 3.2	A2Q4	E	+ 1.25
	G	0.0		B	+ 1.95
	D	+ 15		C	+ 7
A2Q1	E	+ 0.45	A2Q5	E	- 12
	B	+ 1.1		B	- 11
	C	+ 1.9		C	0.0
A2Q2	S	+ 1.95	A2Q6	E	- 10
	G	0.0		B	- 9.5
	D	+ 15		C	0.0

fault to a defective component or connection. After the problem has been corrected, check the 10.7 MHz filter switch for normal operation by repeating the checkout procedure above.

(a) Figure 5-11, 10.7 MHz filter switch fault logic diagram.

(b) Table 5-5, 10.7 MHz filter switch voltage.

(c) Figure FO-4, 10.7 MHz filter switch schematic diagram.

(d) 10.7 MHz filter switch circuit description, paragraph 3-18a.

(e) Figure 7-12, 10.7 MHz filter switch, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

(g) 10.7 MHz filter switch adjustment, paragraph 6-6a.

i. 10.7 MHz/455 kHz Converter (A4A2).

WARNING

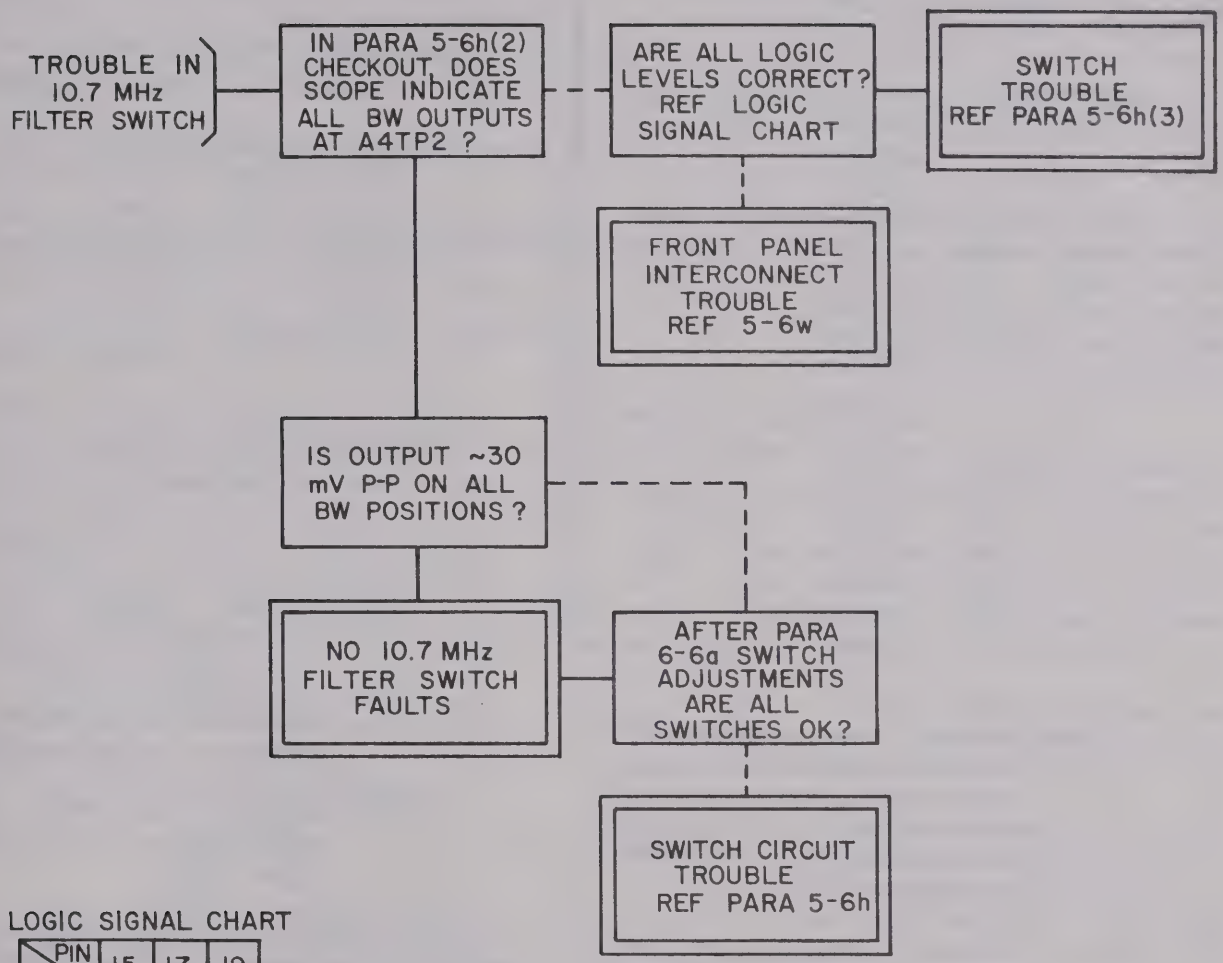
This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clipleads on one end (2).

NOTE

When a signal is injected into the 1st or 2nd if. and its frequency increases, the frequency of the 3rd if. signal decreases. There is no apparent reversal from the if. input to the 3rd if.


TROUBLE IN 10.7 MHz FILTER SWITCH
IN PARA 5-6h(2) CHECKOUT, DOES SCOPE INDICATE ALL BW OUTPUTS AT A4TP2 ?
ARE ALL LOGIC LEVELS CORRECT? REF LOGIC SIGNAL CHART
SWITCH TROUBLE REF PARA 5-6h(3)
FRONT PANEL INTERCONNECT TROUBLE REF 5-6w
IS OUTPUT ~30 mV P-P ON ALL BW POSITIONS ?
NO 10.7 MHz FILTER SWITCH FAULTS
AFTER PARA 6-6a SWITCH ADJUSTMENTS ARE ALL SWITCHES OK?
SWITCH CIRCUIT TROUBLE REF PARA 5-6h
LEGEND
YES
NO

LOGIC SIGNAL CHART

BW \ PIN	15	17	19
16	X		
6		X	
3.2			X
1.0			X
.3			X

X=VOLTAGE AT PIN ≥ 2.5V

Figure 5-11. 10.7 MHz Filter Switch Fault Logic Diagram

Table 5-5. 10.7 MHz Filter Switch Voltage

Transistor	Pin	Bandwidth (kHz) 16	6	3.2	Transistor	Pin	Bandwidth (kHz) 16	6	3.2
Q1	A	+15.26	+15.26	+14.50	Q4	C	+15.32	+15.32	+15.29
	B	- 2.38	- 2.38	+ 2.68		B	- 2.24	- 2.24	+ 2.48
	C	0.00	0.00	+ 2.04		E	0.00	0.00	+ 1.83
Q2	C	+15.26	+14.49	+15.26	Q5	C	+15.32	+15.29	+15.32
	B	- 2.53	+ 2.85	- 2.53		B	- 2.21	+ 2.44	- 2.21
	E	0.00	+ 2.19	0.00		E	0.00	+ 1.78	0.00
Q3	C	+15.17	+15.25	+15.26	Q6	C	+15.29	+15.32	+15.32
	B	+ 2.76	- 2.36	- 2.36		B	+ 2.50	- 2.23	- 2.23
	E	+ 2.01	0.00	0.00		E	+ 1.88	0.00	0.00

(c) Connect the oscilloscope to A4XA2 pin 19 (TP13) using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4XA2 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(e) Set the generator output frequency to 10.7 MHz and the output level to -28 dBm.

(f) Energize the receiver. The oscilloscope should display a level of appx. 0.1 V p-p at appx. 455 kHz. The waveform should be a clean sine wave.

(g) Deenergize the receiver and disconnect the test equipment.

(h) Reinstall pc cards A4A1, A4A3, A4A4 and A4A5 in their proper slots.

(3) 10.7 MHz/455 kHz converter fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 10.7 MHz/455 kHz converter for normal operation by repeating the checkout procedure above.

(a) Figure 5-12, 10.7 MHz/455 kHz converter fault logic diagram.

(b) Table 5-6, 10.7 MHz/455 kHz converter voltage table.

(a) Figure 5-12, 10.7 MHz/455 kHz converter fault logic diagram.

(b) Table 5-6, 10.7 MHz/455 kHz converter voltage table.

(c) Figure FO-5, 10.7 MHz/455 kHz converter schematic diagram.

(d) 10.7 MHz/455 kHz converter circuit description, paragraph 3-19.

(e) Figure 7-13, 10.7 MHz/455 kHz converter, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

Table 5-6. 10.7 MHz/455 kHz Converter Voltage

Transistor	Pin	Voltage
A2Q1	Emitter	+ 3.24
	Base	+ 3.96
	Collector	+ 14.8

j. 455 kHz Filter Switch (A4A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clip leads at one end (2).

(2) 455 kHz filter switch checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6j(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A2, A4A4, A4A5, and A4A7.

(c) Depress the receiver IF BANDWIDTH kHz-16 pushbutton.

(d) Connect the oscilloscope vertical input to A4XA3 pin 57 (TP3) using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(e) Connect the signal generator rf output to A4XA3 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(f) Set the generator output frequency to 455 kHz and the output level to -36 dBm.

(g) Energize the receiver. The oscilloscope should display a level of appx. 15 millivolts p-p at appx. 455 kHz. The waveform should be a clean sine wave.

(h) Depress the IF BANDWIDTH kHz-1.0 pushbutton and then the .3 pushbutton.

(i) The oscilloscope should display a level of appx. 15 millivolts p-p at appx. 455 kHz for both bandwidth positions.

(j) Deenergize the receiver and disconnect the test equipment.

(k) Replace pc cards A4A2, A4A4, A4A5 and A4A7 in their proper slots.

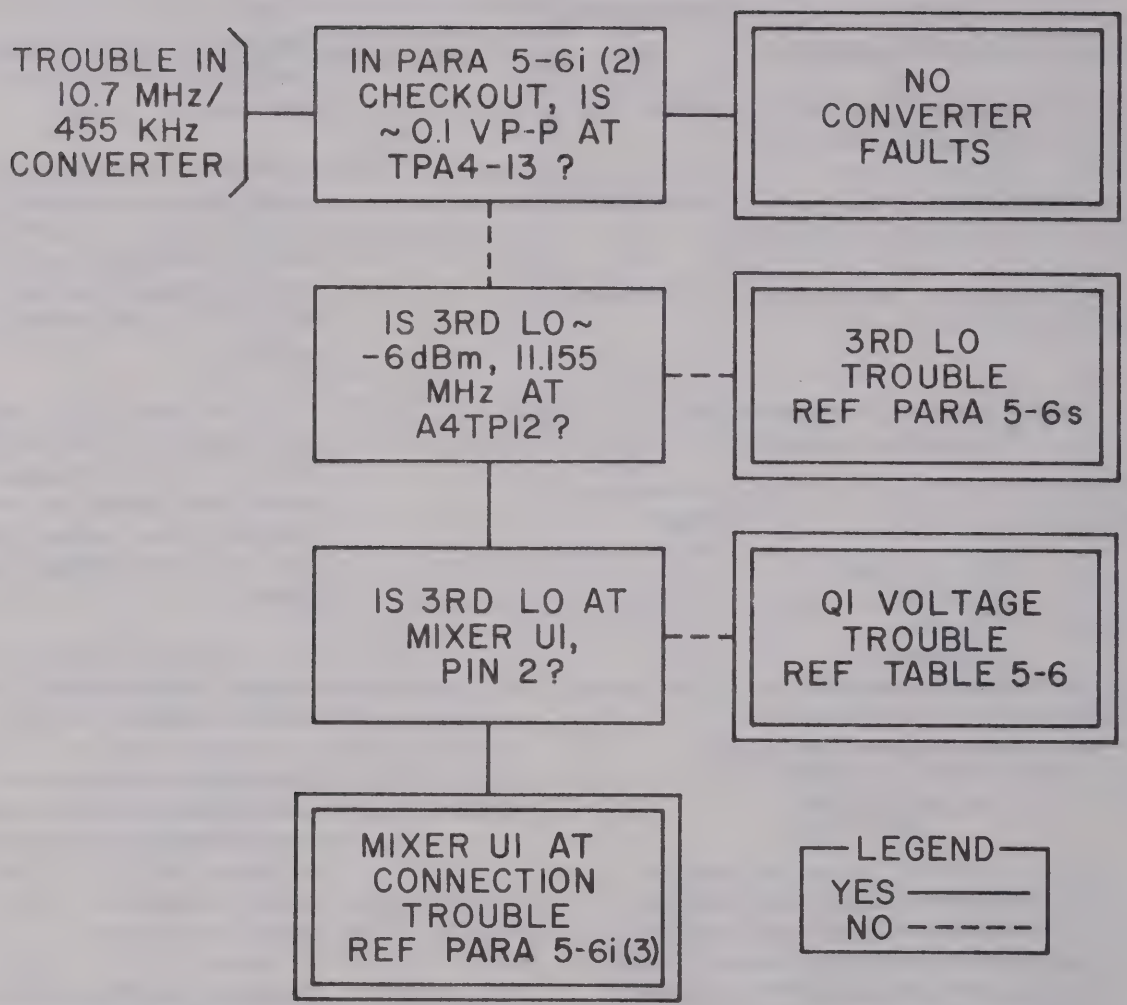

TROUBLE IN 10.7 MHz/ 455 KHz CONVERTER
IN PARA 5-6i (2) CHECKOUT, IS ~0.1 V P-P AT TPA4-13 ?
NO CONVERTER FAULTS
IS 3RD LO ~ -6dBm, 11.155 MHz AT A4TP12 ?
3RD LO TROUBLE REF PARA 5-6s
IS 3RD LO AT MIXER UI, PIN 2?
QI VOLTAGE TROUBLE REF TABLE 5-6
MIXER UI AT CONNECTION TROUBLE REF PARA 5-6i(3)
LEGEND
YES
NO

Figure 5-12. 10.7 MHz/455 kHz Converter Fault Logic Diagram

(3) 455 kHz filter switch fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 455 kHz filter switch for normal operation by repeating the checkout procedure above.

(a) Figure 5-13, 455 kHz filter switch fault logic diagram.

(b) Table 5-7, 455 kHz filter switch voltage.

(c) Figure FO-6, 455 kHz filter switch schematic diagram.

(d) 455 kHz filter switch circuit description, paragraph 3-21.

(e) Figure 7-14, 455 kHz filter switch, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

k. Usb Filter Switch (A4A4).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, for details see table 1-3.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clip leads on one end (2)

(2) Usb filter switch checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6i(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A2, A4A3, A4A5, and A4A7.

(c) Connect the oscilloscope vertical input to A4XA4 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4XA4 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

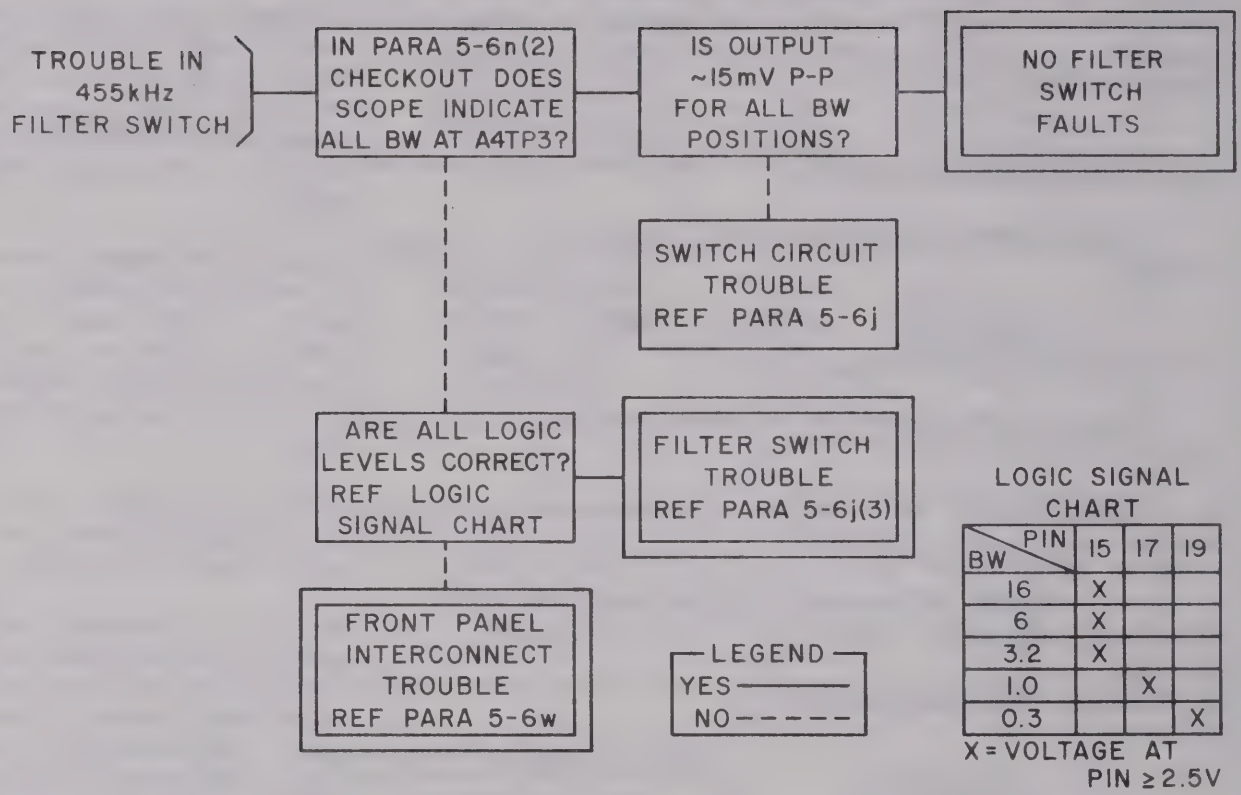
(e) Set the generator output frequency to 456.6 kHz and the output level to -36 dBm.

(f) Energize the receiver and depress the DETECTION MODE-USB pushbutton. The oscilloscope should display a level of appx. 200 millivolts p-p at appx. 456.5 kHz. The waveform should be a clean sine wave.

(g) Deenergize the receiver and disconnect the test equipment.

(h) Reinstall pc cards A4A2, A4A3, A4A5 and A4A7 in their proper slots.

(3) Usb filter switch fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the usb filter switch for normal operation by repeating the checkout procedure above.


TROUBLE IN 455kHz FILTER SWITCH
IN PARA 5-6n(2) CHECKOUT DOES SCOPE INDICATE ALL BW AT A4TP3?
IS OUTPUT ~15mV P-P FOR ALL BW POSITIONS?
NO FILTER SWITCH FAULTS
SWITCH CIRCUIT TROUBLE REF PARA 5-6j
ARE ALL LOGIC LEVELS CORRECT? REF LOGIC SIGNAL CHART
FILTER SWITCH TROUBLE REF PARA 5-6j(3)
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
LEGEND
YES
NO
LOGIC SIGNAL CHART
X = VOLTAGE AT PIN ≥ 2.5V

BW \ PIN	15	17	19
16	X		
6	X		
3.2	X		
1.0		X	
0.3			X

Figure 5-13. 455 kHz Filter Switch Fault Logic Diagram

Table 5-7. 455 kHz Filter Switch Voltage

Component	Pin	Bandwidth (kHz)		
		16/6/3.2	1.0	.3
U1	1	- 12.9	+ 13.5	- 12.9
	3	0.0	+ 4.6	0.0
	5	+ 4.4	0.0	0.0
	7	+ 13.6	- 13	- 13
	11	- 14	- 14	- 14
	12	0.0	0.0	+ 4.6
	13	+ 2.7	+ 2.7	+ 2.7
	14	- 13	- 13	+ 13.6
Q1	E	0.0	0.0	0.0
	B	- 1.8	- 1.8	+ 1.8
	C	+ 14.9	+ 14.9	+ 14.9
Q2	E	0.0	0.0	+ 0.9
	B	- 1.5	- 1.5	+ 1.5
	C	14	14	14
Q3	E	0.0	+ 2.3	0.0
	B	- 3	+ 3	- 3
	C	14.9	14.3	14.8
Q4	E	0.0	0.8	0.0
	B	- 1.4	+ 1.4	- 1.4
	C	14	14	14
Q5	E	1.25	0.0	0.0
	B	+ 1.9	- 1.9	- 1.9
	C	+ 14.7	+ 14.7	+ 14.7
Q6	E	+ 0.8	0.0	0.0
	B	+ 1.4	- 1.4	- 1.4
	C	+ 14	+ 14	+ 14

(a) Figure 5-14, usb filter switch fault logic diagram.

(b) Table 5-8, usb filter switch voltage.

(c) Figure FO-7, usb filter switch schematic diagram.

(d) Usb filter switch circuit description, paragraph 3-22.

(e) Figure 7-15, usb filter switch, location of components.

(f) Usb and isb/lsb filter switch adjustments, paragraph 6-6d.

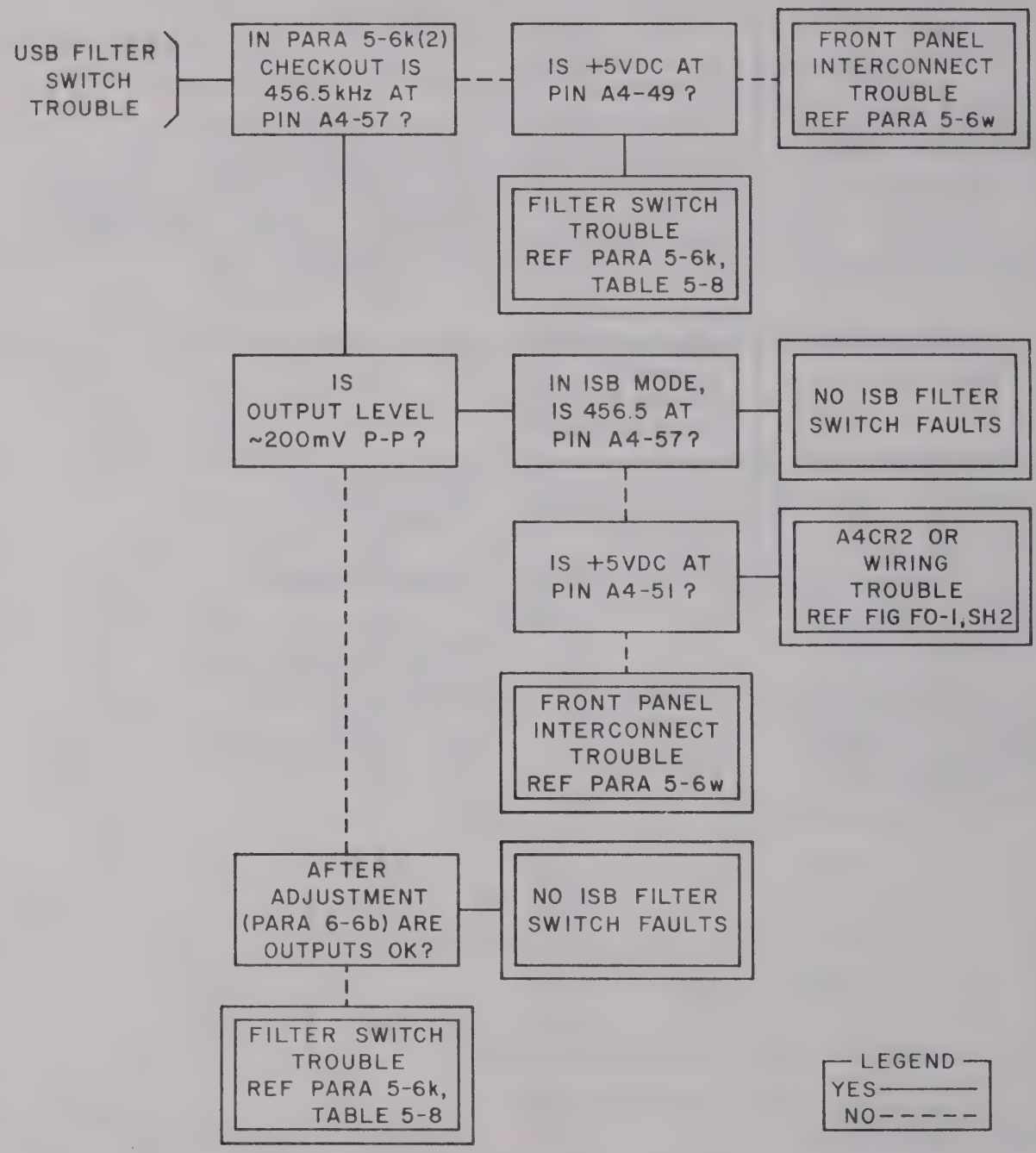

USB FILTER SWITCH TROUBLE
IN PARA 5-6k(2) CHECKOUT IS 456.5kHz AT PIN A4-57 ?
IS +5VDC AT PIN A4-49 ?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
FILTER SWITCH TROUBLE REF PARA 5-6k, TABLE 5-8
IS OUTPUT LEVEL ~200mV P-P ?
IN ISB MODE, IS 456.5 AT PIN A4-57?
NO ISB FILTER SWITCH FAULTS
IS +5VDC AT PIN A4-51 ?
A4CR2 OR WIRING TROUBLE REF FIG FO-1,SH2
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
AFTER ADJUSTMENT (PARA 6-6b) ARE OUTPUTS OK?
NO ISB FILTER SWITCH FAULTS
FILTER SWITCH TROUBLE REF PARA 5-6k, TABLE 5-8
LEGEND
YES
NO

Figure 5-14. Usb Filter Switch Fault Logic Diagram

Table 5-8. Usb Filter Switch Voltage

Transistor	Pin	Voltage usb mode	Voltage other modes
Q1	C	+ 14.69	+ 15.38
	B	+ 2.34	- 2.15
	E	+ 1.68	0.00
Q2	C	+ 14.78	+ 15.38
	B	+ 1.80	- 1.76
	E	+ 1.14	0.00

l. Isb/lsb filter switch (A4A5).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clip leads on one end (2)

(2) Isb/lsb filter switch checkout procedures. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6j(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A2, A4A3, A4A4, A4A7, and A4A8.

(c) Connect the oscilloscope vertical input to A4XA5 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4XA5 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if motherboard ground plane

(e) Set the generator output frequency to 453.5 kHz and the output level to -36 dBm.

(f) Energize the receiver and depress the DETECTION MODE-LSB pushbutton. The oscilloscope should display a level of appx. 200 millivolts p-p at appx. 453.5 kHz. The waveform should be a clean sine wave.

(g) Move the oscilloscope clip lead to pin A4XA5-53 (TP14) and depress the DETECTION MODE-ISB pushbutton. The oscilloscope should display a level of appx. 200 mV p-p at appx. 453.5 kHz.

(h) Deenergize the receiver and disconnect the test equipment.

(i) Replace pc cards A4A2, A4A3, A4A4, A4A7 and A4A8 in their proper slots.

(3) Isb/lsb filter switch fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the isb/lsb filter switch for normal operation by repeating the checkout procedure above.

(a) Figure 5-15, isb/lsb filter switch fault logic diagram.

(b) Table 5-9, isb/lsb filter switch voltage.

(c) Figure FO-8, isb/lsb filter switch schematic diagram.

(d) Isb/lsb filter switch circuit description, paragraph 3-24.

(e) Figure 7-16, isb/lsb filter switch, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

(g) Usb and isb/lsb filter switches adjustments, paragraph 6-6d.

m. Automatic Gain Control (A4A6).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Digital voltmeter
(c) Short length of coaxial cable with clip leads on one end (2)

(2) Age checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6m(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A3, A4A4, A4A5, and A4A10.

(c) Depress GAIN MODE-AGC-FAST and the METER-LINE AUDIO pushbuttons.

(d) Connect the digital voltmeter input to A4XA6 pin 47 (TP19) using a short cable with clip leads one one end. Connect the common lead to the if. motherboard ground plane.

(e) Set the digital voltmeter to the 20 Vdc range.

(f) Connect the signal generator output to A4XA7 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(g) Set the generator output frequency to 455 kHz and the output level to -40 dBm.

(h) Energize the receiver. The digital voltmeter should indicate appx. -3.5 Vdc.

(i) Depress the receiver GAIN MODE-MAN pushbutton. Adjust the RF GAIN control until the digital voltmeter indicates the same level indicated in step (f).

(j) Depress the GAIN MODE-AGC-FAST pushbutton.

(k) Connect the digital voltmeter clip lead to A4XA6 pin 19. The voltmeter should indicate appx. +0.7 Vdc.

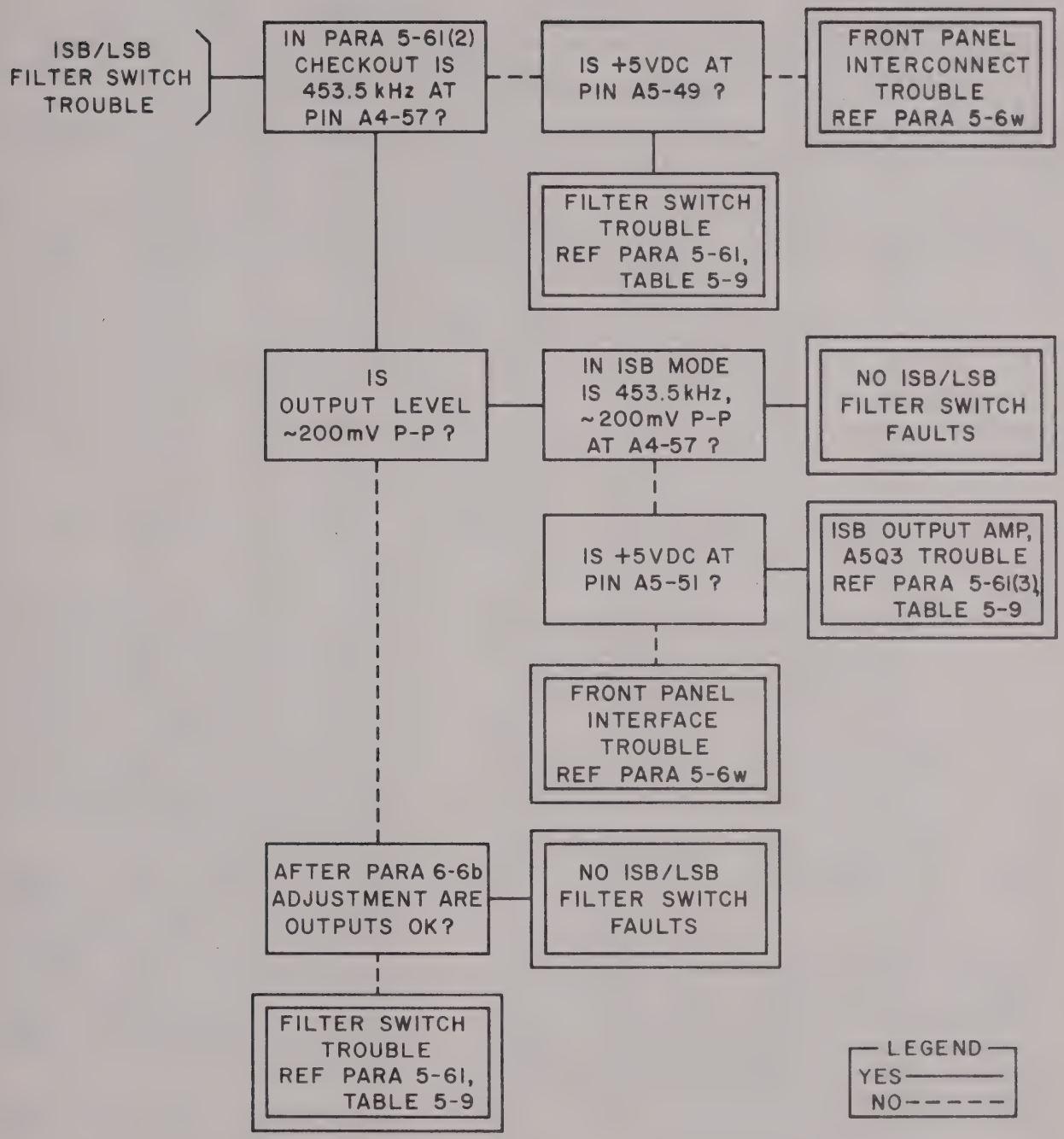

ISB/LSB FILTER SWITCH TROUBLE
IN PARA 5-61(2) CHECKOUT IS 453.5 kHz AT PIN A4-57 ?
IS +5VDC AT PIN A5-49 ?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
FILTER SWITCH TROUBLE REF PARA 5-61, TABLE 5-9
IS OUTPUT LEVEL ~200mV P-P ?
IN ISB MODE IS 453.5kHz, ~200mV P-P AT A4-57 ?
NO ISB/LSB FILTER SWITCH FAULTS
IS +5VDC AT PIN A5-51 ?
ISB OUTPUT AMP, A5Q3 TROUBLE REF PARA 5-61(3), TABLE 5-9
FRONT PANEL INTERFACE TROUBLE REF PARA 5-6w
AFTER PARA 6-6b ADJUSTMENT ARE OUTPUTS OK?
NO ISB/LSB FILTER SWITCH FAULTS
FILTER SWITCH TROUBLE REF PARA 5-61, TABLE 5-9
LEGEND
YES
NO

Figure 5-15. Isb/Lsb Filter Switch Fault Logic Diagram

Table 5-9. Isb/Lsb Filter Switch Voltage

Transistor	Pin	Lsb mode	Isb mode	Other modes
Q1	C	+ 14.65	+ 14.67	+ 15.37
	B	+ 2.18	+ 2.19	- 1.26
	E	+ 1.53	+ 1.54	0.00
Q2	C	+ 14.57	+ 15.02	+ 15.37
	B	+ 2.25	- 2.21	- 2.18
	E	+ 1.59	0.00	0.00
Q3	C	+ 14.99	+ 14.64	+ 15.37
	B	- 2.23	+ 2.11	- 2.21
	E	0.00	+ 1.45	0.00

(l) Connect the digital voltmeter clip lead to A4XA6 pin 41. The voltmeter should indicate appx. -3.0 Vdc.

(m) Deenergize the receiver and disconnect the test equipment.

(n) Reinstall pc cards A4A3, A4A4, A4A5, and A4A10 in their proper slots.

(3) Agc fault isolation. The items listed below are provided as an aid in fault isolation. Use the data to trace the fault to a defective component or connection. After the problem has been corrected, check the agc card for normal operation by repeating the checkout procedure above.

(a) Table 5-10, agc voltage.

NOTE

Two sets of data are given: one with an input signal and one without. When using the input signal data, tune the receiver to 15.00500 MHz and inject an unmodulated signal of 15.00500 MHz at -40 dBm into rf input jack A2J1. Nominal voltage values are given for each of the three gain modes: manual mode, fast automatic gain mode, and slow automatic gain mode. The RF GAIN control must be set fully clockwise when using manual gain mode no signal data. To use data for the manual gain mode with input signal, reduce the gain setting to achieve the same front panel meter reading as in one of the automatic gain control modes.

(b) Figure FO-9, agc amplifier schematic diagram.

(c) Agc circuit description, paragraph 3-26.

(d) Figure 7-17, agc amplifier, location of components.

Table 5-10. Age Voltage

Component	Pin	Input signal			No signal		
		Man.	Slow	Fast	Man.	Slow	Fast
Q1	E	1.7	2.2	2.2	0.05	0.06	0.06
	B	2.0	2.6	2.6	+ 0.4	0.38	0.38
	C	14.3	14.3	14.4	14.4	14.3	14.4
Q2	E	0.77	0.77	0.77	0.06	0.06	0.06
	B	0.18	0.20	0.20	0.02	0.2	0.02
	C	0.0	0.13	0.13	0.0	0.0	0.0
Q3	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	0.6	0.0	0.0	0.59	0.0	0.0
	C	0.0	0.0	0.0	0.01	0.0	0.0
Q4	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3
	C	- 0.06	- 0.6	- 0.6	0.0	0.0	0.0
Q5	E	- 2.9	- 2.8	- 2.8	- 0.50	0.07	0.07
	B	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3
	C	- 0.6	- 0.6	- 0.6	0.0	0.0	0.0
Q6	E	0.0	0.0	0.0	0.0	0.0	
	B	0.58	0.0	0.54	0.0	0.0	
	C	0.05	0.13	0.13	0.01	0.0	0.0
Q7	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	- 3.9	0.62	- 3.9	- 3.9	0.63	- 3.9
	C	na	na	na	na	na	na
U1	1	2.0	2.2	2.2	0.06	0.07	0.07
	2	2.0	2.2	2.2	0.06	0.07	0.07
	3	2.0	2.2	2.2	0.05	0.06	0.05
	4	14.3	14.3	14.4	14.4	14.3	14.4
	5	0.0	5.0	0.0	0.0	5.0	0.0
	6	1.5	1.7	1.7	1.7	1.7	1.7
	7	- 12.6	12.9	- 12.6	- 12.9	12.9	- 12.6
	8	- 2.0	- 2.2	- 2.2	- 0.05	- 0.05	- 0.05
	9	0.0	0.0	0.0	0.0	0.0	0.0
	10	0.0	0.0	0.0	0.0	0.0	0.0
	11	- 13.8	- 13.8	- 13.8	- 13.8	- 13.9	- 13.8
	12	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07
	13	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07
	14	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07

Table 5-10. Age Voltage-Continued

Component	Pin	Input signal			No signal		
		Man.	Slow	Fast	Man.	Slow	Fast
U2	1	0.86	0.82	0.83	- 0.08	- 0.08	- 0.08
	2	0.86	0.82	0.83	- 0.08	- 0.8	- 0.8
	3	0.86	0.82	0.83	- 0.08	- 0.08	- 0.08
	4	14.3	14.4	14.4	14.3	14.3	
	5	0.0	0.0	0.0	0.0		
	6	0.0	0.0	0.0	0.0	0.0	0.0
	7	- 6.6	- 6.5	- 6.5	- 0.8	0.12	0.12
	8	- 0.25	- 0.24	- 0.24	0.03	0.03	0.03
	9	- 0.05	- 0.06	0.0	0.0	0.0	
	10	- 0.06	- 0.06	- 0.06	0.0	0.0	0.0
	11	- 13.8	- 13.8	- 13.8	- 13.8	- 13.9	- 13.8
	12	0.0	0.0	0.0	0.0	0.0	0.0
	13	0.0	0.0	0.0	0.0	0.0	0.0
	14	0.85	0.82	0.8	0.0	0.0	0.0

(e) Parts replacement guidelines, chapter 6, section II.

n. 455 kHz Amplifier/Am. Detector (A4A7).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clip leads at one end (2).

(2) 455 kHz amplifier/am. detector checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6n(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A3, A4A6, A4A9 and A4A10.

(c) Connect the oscilloscope vertical input to A4XA7 pin 17 (TP18) using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4XA7 pin 57 using a short coaxial cable with clip leads on one end. Connect cable shield to the if. motherboard ground plane.

(e) Set the generator output frequency to 455 kHz and output level to -74 dBm.

(f) Energize the receiver. The oscilloscope should display a

level of appx. 60 millivolts p-p at appx. 455 kHz. The waveform should be a clean sine wave.

(g) Move the oscilloscope clip lead to A4XA7 pin 13 (TP6). The oscilloscope should display a level of appx. 60 millivolts p-p at appx. 455 kHz.

(h) Turn on the signal generator am. modulation and set it for 50% modulation at 400 Hz.

(i) Move the oscilloscope clip lead to A4XA7 pin 51 (TP5). The oscillosocope should display a level of appx. 0.3 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(j) Deenergize the receiver and disconnect the test equipment.

(k) Reinstall pc cards A4A3, A4A6, A4A9, and A4A10 in their proper slots.

(3) 455 kHz amplifier/am. detector fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 455 kHz amplifier/am. detector for normal operation by repeating the checkout procedure above.

(a) Figure 5-16, 455 kHz amplifier/am. detector fault logic diagram.

(b) Table 5-11, 455 kHz amplifier/am. detector voltage.

(c) Figure FO-10, 455 kHz amplifier/am. detector schematic diagram.

(d) 455 kHz amplifier/am. detector circuit description, paragraph 3-25.

(e) Figure 7-18, 455 kHz amplifier/am. detector, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

(g) 455 kHz amplifier/am. detector response alignment, paragraph 6-6b.

(h) 455 kHz amplifier/am. detector gain adjustment, paragraph 6-6c.

o. Isb Detector/Audio (A4A8).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Oscilloscope
(c) Two short lengths of coaxial cable with clip leads one one end (2)

(2) Isb detector/audio checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6o(3), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A5 and A4A6.

(c) Connect the oscilloscope vertical input to A4XA8 pin 41 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

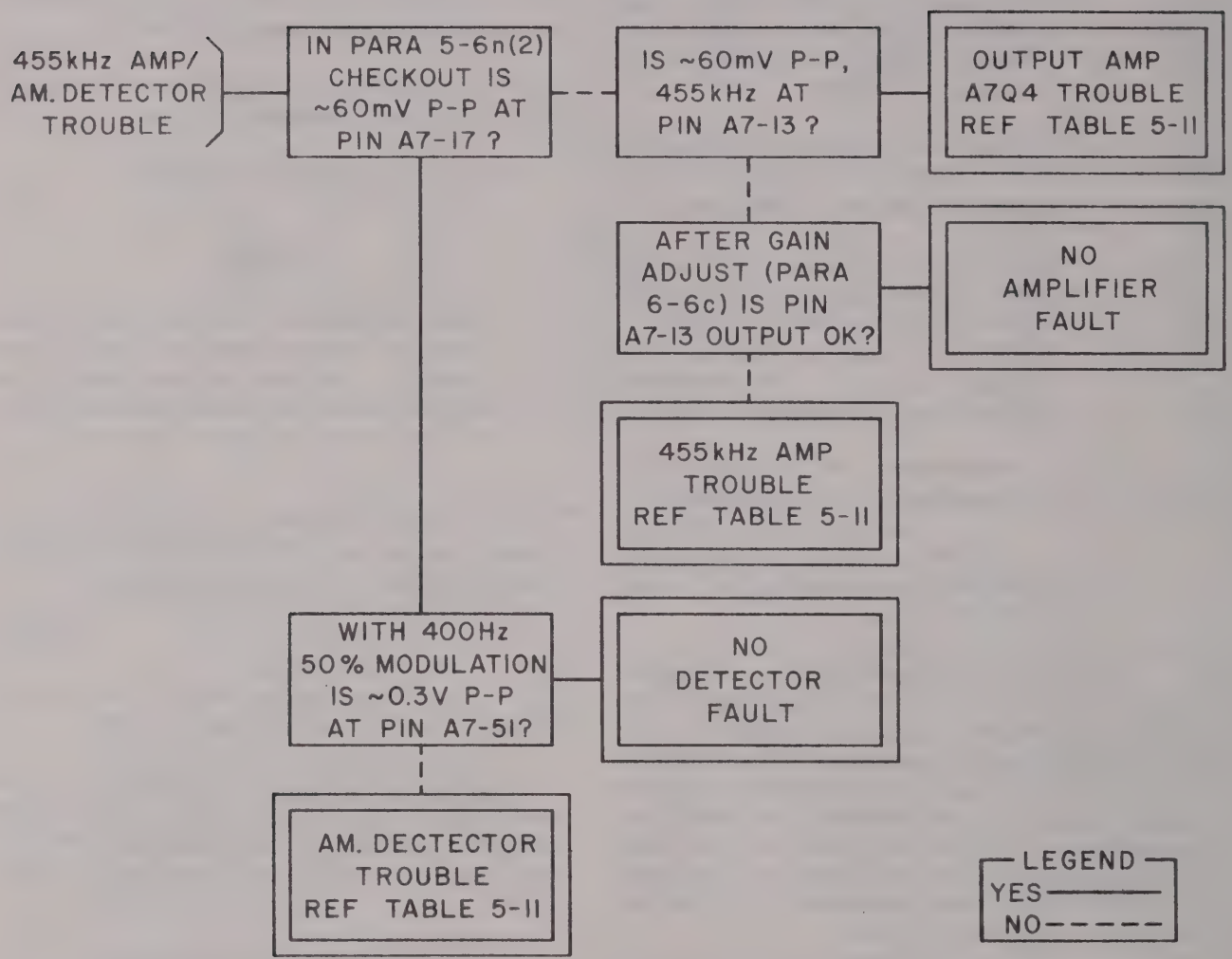


Figure 5-16. 455 kHz Amplifier/Am. Detector Fault Logic Diagram

Table 5-11. 455 kHz Amplifier/Am. Detector Voltage

Transistor	Pin	Voltage	Transistor	Pin	Voltage
Q1	1	+ 13.7	Q4	E	+ 3.5
	2	+ 3.75		B	+ 4.1
	3	+ 0.87		C	+ 14.4
	4	+ 1.6			
Q2	1	+ 15	Q5	E	- 0.7
	2	+ 3.8		B	- 0.1
	3	+ 0.9		C	+ 14.2
	4	+ 1.4			
Q3	E	- 0.5	Q6	E	+ 0.46
	B	0.0		B	+ 0.95
	C	+ 15.0		C	+ 15.0

(d) Connect the signal generator rf output to A4XA8 pin 53 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(e) Set the generator output frequency to 454.6 kHz and the output level to -46 dBm.

(f) Energize the receiver and depress the DETECTION MODE-ISB pushbutton. The oscilloscope should display a level of appx. 11 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(g) Move the oscilloscope clip lead to A4XA8 pin 44 (TP16). Move the shield clip lead to A4XA8 pin 48.

(h) Adjust A8R36 for an oscilloscope reading of appx. 8 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(i) Move the oscilloscope clip lead to A4XA8 pin 43. Connect the cable shield to the if. motherboard ground plane. The oscilloscope should display appx. 0.0 Vdc.

(j) Increase the generator output level by 10 dBm. The level displayed on the oscilloscope should increase to appx. -2.5 Vdc.

(k) Deenergize the receiver and disconnect the test equipment.

(l) Reinstall pc cards A4A5 and A4A6 in the proper slots.

(3) Isb detector/audio fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the isb detector/audio card for normal operation by repeating the checkout procedure above.

(a) Figure 5-17, isb detector/audio fault logic diagram.

(b) Table 5-12, isb detector/audio voltage.

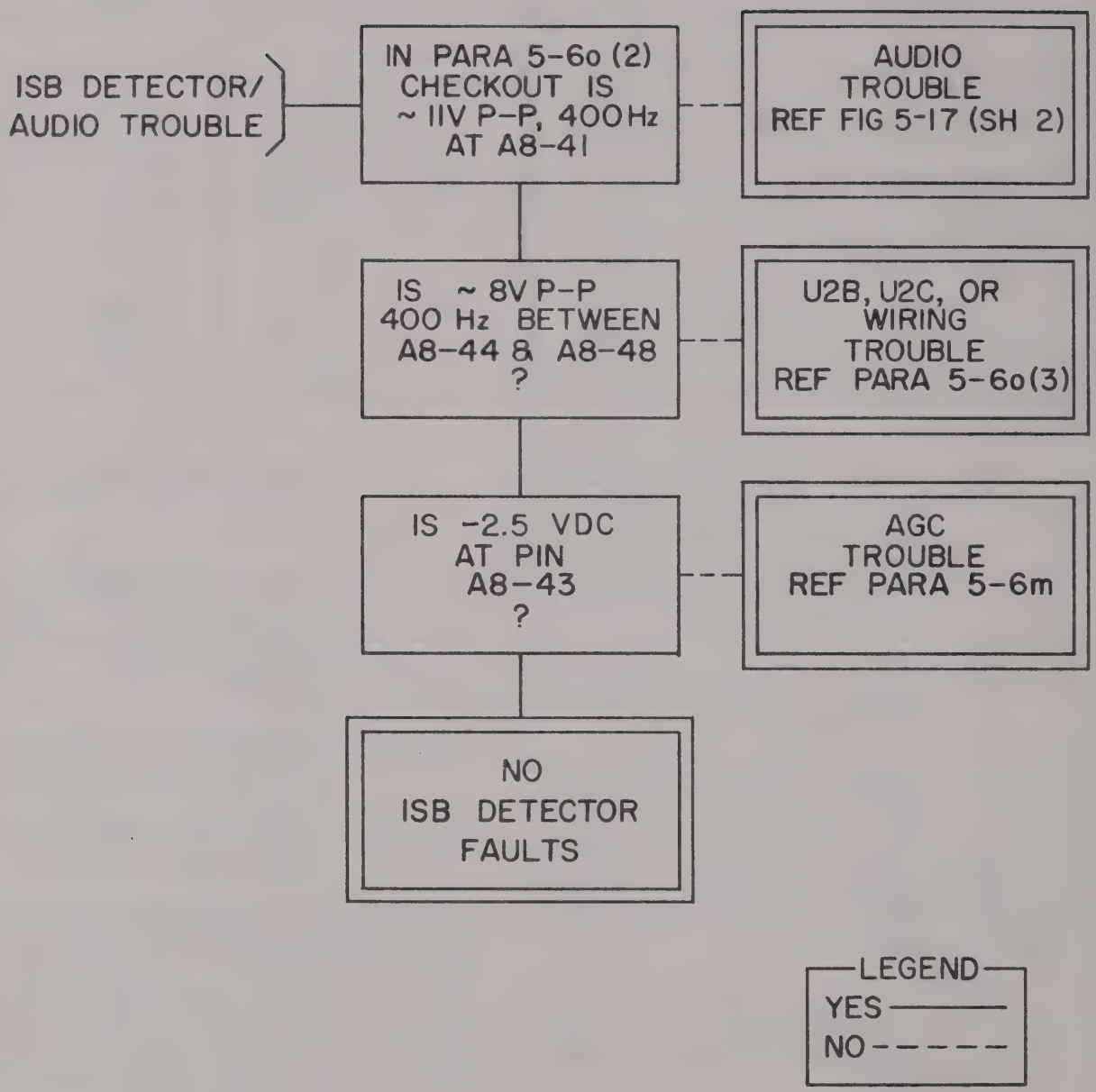


Figure 5-17. Isb Detector/Audio Fault Logic Diagram (Sheet 1 of 2)

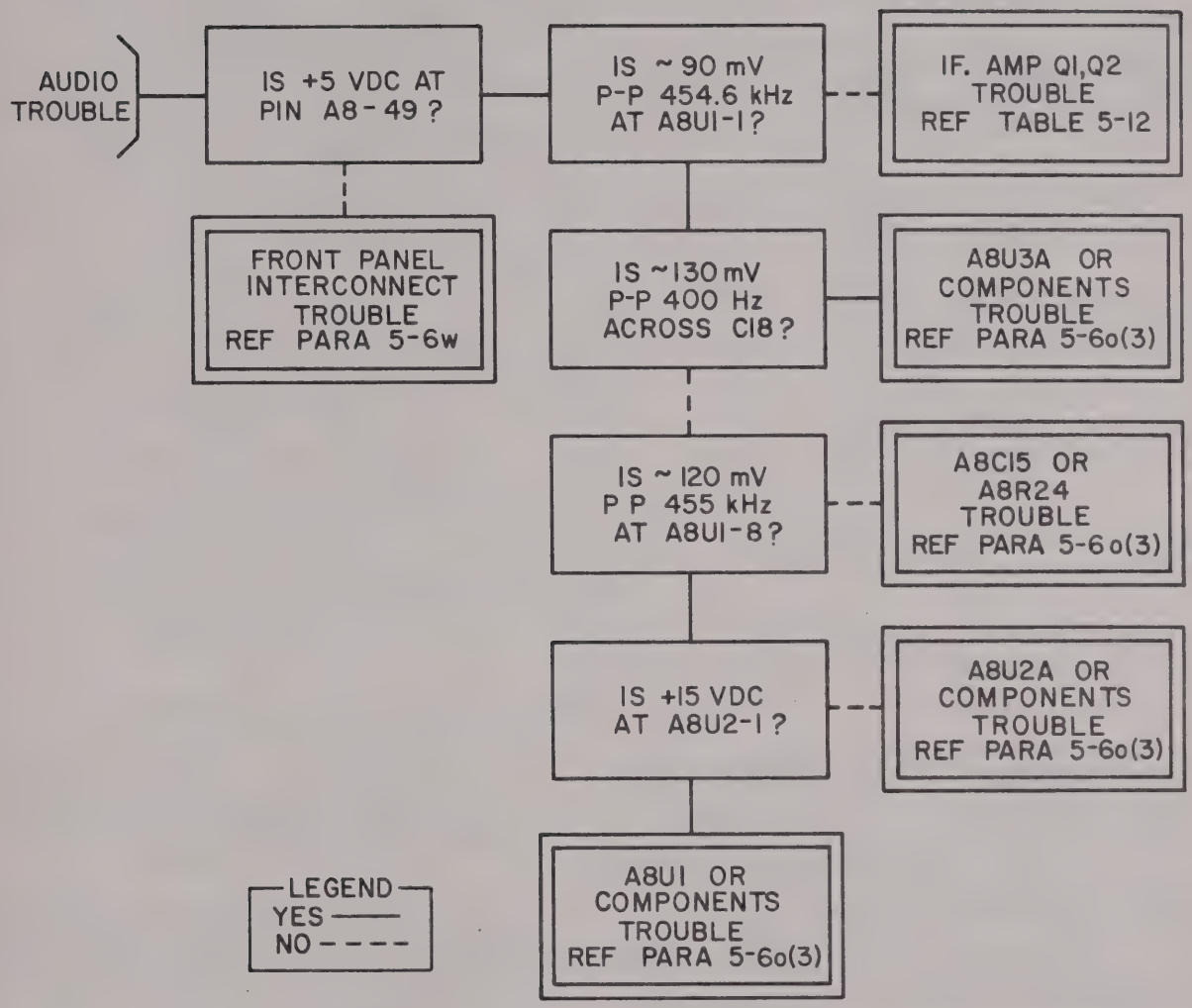

AUDIO TROUBLE
IS +5 VDC AT PIN A8-49 ?
IS ~ 90 mV P-P 454.6 kHz AT A8U1-1?
IF. AMP Q1,Q2 TROUBLE REF TABLE 5-12
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
IS ~130 mV P-P 400 Hz ACROSS C18?
A8U3A OR COMPONENTS TROUBLE REF PARA 5-6o(3)
IS ~ 120 mV P P 455 kHz AT A8U1-8?
A8C15 OR A8R24 TROUBLE REF PARA 5-6 o(3)
IS +15 VDC AT A8U2-1 ?
A8U2A OR COMPONENTS TROUBLE REF PARA 5-6o(3)
A8U1 OR COMPONENTS TROUBLE REF PARA 5-6o(3)
LEGEND
YES ——
NO - - - -

Figure 5-17. Isb Detector/Audio Fault Logic Diagram (Sheet 2 of 2)

Table 5-12. ISB Detector/Audio Voltage Table

Component	Pin	Isb	Other modes	Component	Pin	Isb	Other modes
U1	1	- 7.5	- 7.5	Q1	1	+ 14.5	+ 14.5
	4	- 7	- 7		2	+ 3.3	+ 3.3
	5	- 13.5	- 13.5		3	+ 0.9	+ 0.9
	6	+ 1.3	- 0.8		4	+ 1	+ 1
	12	+ 1	- 0.8				
	14	+ 15	+ 15	Q2	1	+ 14	+ 14
					2	+ 3.3	+ 3.3
U2	1	+ 14	- 13.5		3	+ 0.8	+ 0.8
	2	+ 1.5	+ 1.5		4	+ 1	+ 1
	3	+ 5	0.0				
	4	+ 15	+ 15	Q3	E	0.0	+ 7.5
	11	- 15	- 15		B	+ 0.2	+ 0.2
	12	0.0	0.0		C	0.0	0.0
	13	+ 1	+ 5				
	14	+ 1	+ 5	Q4	E	0.0	0.0
					B	0.0	0.0
U3	4	+ 15	+ 15		C	+ 15	+ 15
	8	0.0	0.0				
	9	0.0	0.0	Q5	E	0.0	0.0
	10	0.0	0.0		B	+ 2.8	- .5
	11	- 15	- 15		C	0.0	0.0
	12	0.0	0.0				
	13	0.0	0.0				
	14	0.0	0.0				

(c) Figure FO-11, isb detector/audio schematic diagram.

(d) Isb detector/audio circuit description, paragraph 3-29.

(e) Figure 7-19, isb detector/audio, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

(g) Isb detector/audio adjustment, paragraph 6-6e.

p. Fm/Cw/Ssb Detector (A4A9).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Wideband oscilloscope
(c) Two short lengths of coaxial cable with clip leads on one end (2)

(2) Cw/ssb detector checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6p(4), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A7 and A4A10.

(c) Connect the oscilloscope vertical input to A4XA9 pin 57 (TP7) using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4X49 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the ground plane.

(e) Set the generator output frequency to 455.4 kHz and output level to -28 dBm.

(f) Energize the receiver and depress the DETECTION MODE-USB pushbutton. The oscilloscope should display a level of appx. 2 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(g) Deenergize the receiver and disconnect the test equipment.

(h) Reinstall pc cards A4A7 and A4A10 in their proper slots.

(3) Fm detector checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6p(4), below.

(a) Deenergize the receiver.

(b) Remove pc cards A4A7 and A4A10.

(c) Connect the oscilloscope vertical input to A4XA9 pin 57 (TP7) using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(d) Connect the signal generator rf output to A4XA9 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the ground plane.

(e) Set the generator output frequency to 455 kHz and the output level to -28 dBm.

(f) Set the generator for fm modulation at 400 Hz and 4.8 kHz deviation.

(g) Energize the receiver and depress the DETECTION MODE-FM pushbutton. The oscilloscope should display a level of appx. 1 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(h) Deenergize the receiver and disconnect the test equipment.

(i) Reinstall pc cards A4A7 and A4A10 in their proper slots.

(4) Fm/cw/ssb detector fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the fm/cw/ssb detector for normal operation by repeating the checkout procedures above.

(a) Figure 5-18, cw/ssb detector fault logic diagram.

(b) Figure 5-19, fm detector fault logic diagram.

(c) Table 5-13, fm/cw/ssb detector voltage.

(d) Figure FO-12, fm/cw/ssb detector schematic diagram.

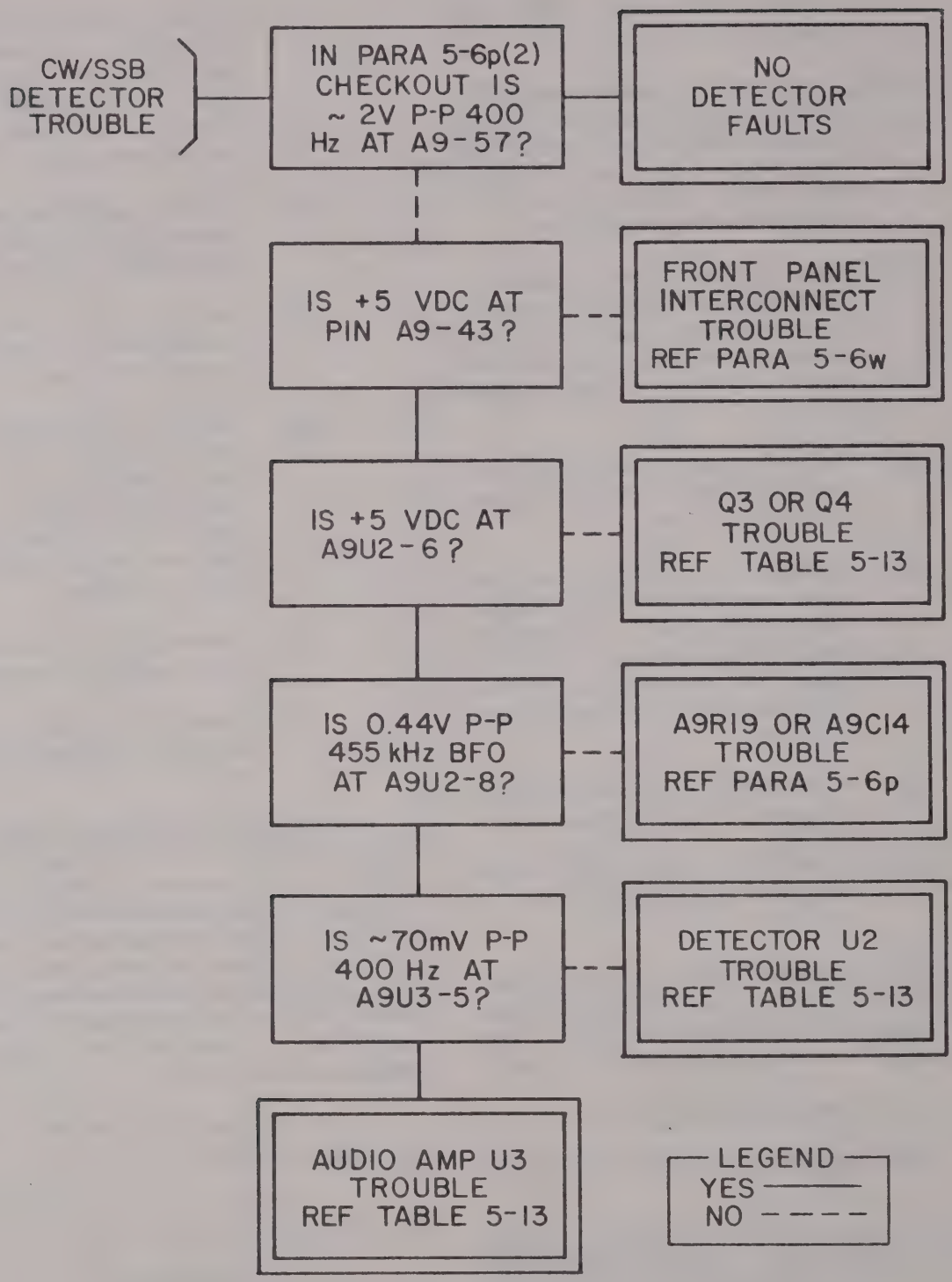

CW/SSB DETECTOR TROUBLE
IN PARA 5-6p(2) CHECKOUT IS ~ 2V P-P 400 Hz AT A9-57?
NO DETECTOR FAULTS
IS +5 VDC AT PIN A9-43?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
IS +5 VDC AT A9U2-6?
Q3 OR Q4 TROUBLE REF TABLE 5-13
IS 0.44V P-P 455 kHz BFO AT A9U2-8?
A9R19 OR A9C14 TROUBLE REF PARA 5-6p
IS ~70mV P-P 400 Hz AT A9U3-5?
DETECTOR U2 TROUBLE REF TABLE 5-13
AUDIO AMP U3 TROUBLE REF TABLE 5-13
LEGEND
YES
NO

Figure 5-18. Cw/Ssb Detector Fault Logic Diagram

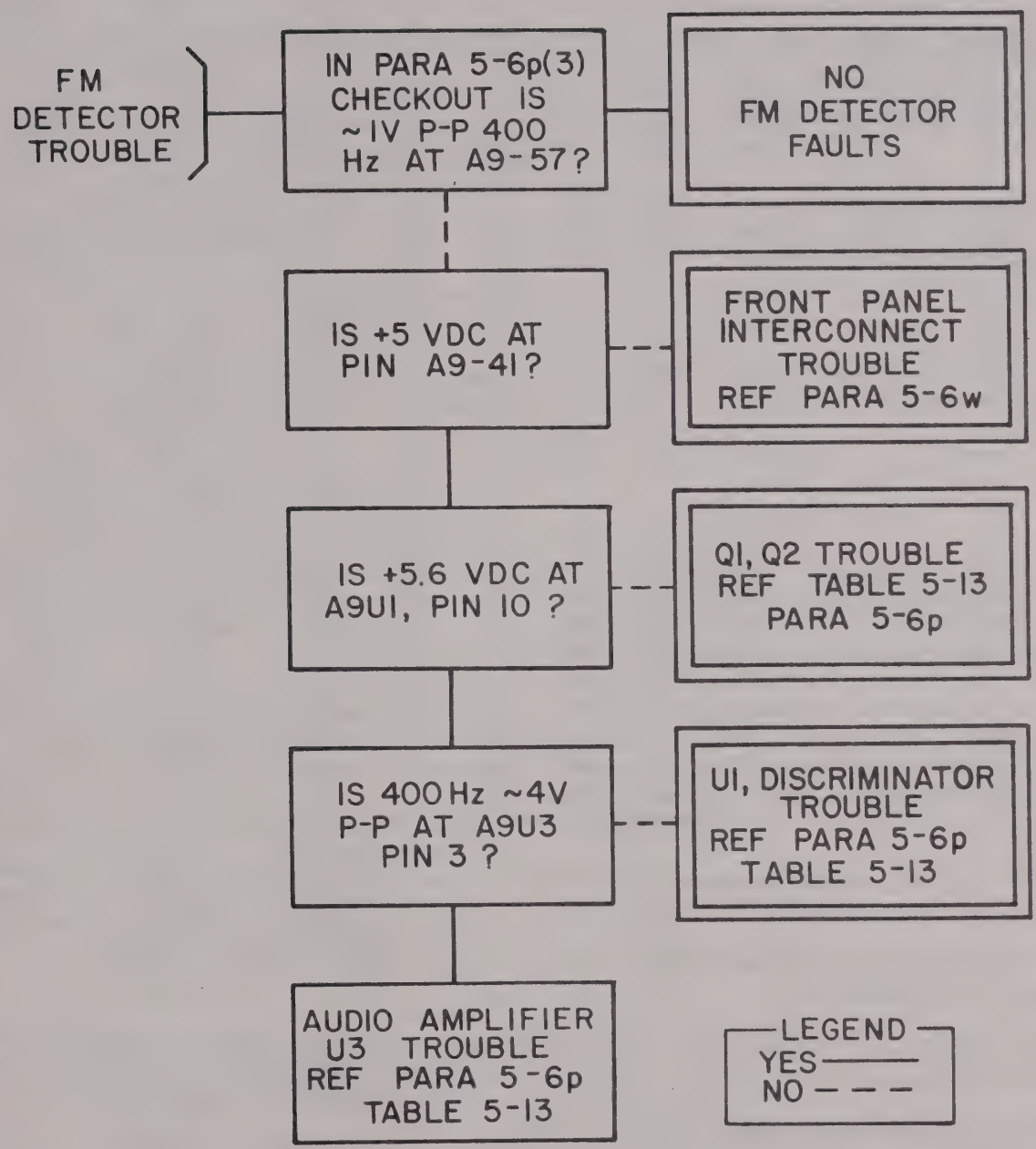

FM DETECTOR TROUBLE
IN PARA 5-6p(3) CHECKOUT IS ~1V P-P 400 Hz AT A9-57?
NO FM DETECTOR FAULTS
IS +5 VDC AT PIN A9-41?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
IS +5.6 VDC AT A9U1, PIN 10 ?
Q1, Q2 TROUBLE REF TABLE 5-13 PARA 5-6p
IS 400 Hz ~4V P-P AT A9U3 PIN 3 ?
U1, DISCRIMINATOR TROUBLE REF PARA 5-6p TABLE 5-13
AUDIO AMPLIFIER U3 TROUBLE REF PARA 5-6p TABLE 5-13
LEGEND
YES
NO

Figure 5-19. Fm Detector Fault Logic Diagram

Table 5-13. Fm/Cw/Ssb Detector Voltage Table

Component	Pin	Am.	Fm	Cw & ssb	Component	Pin	Am.	Fm	Cw & ssb
Q1	E	9.6	8.1	9.2	U2	1	- 1.6	- 1.6	- 1.6
Q1	B	9.5	7.3	9.2	U2	3	- 1.7	- 1.7	- 1.7
Q1	C	0.0	8.0	0.0	U2	4	- 1.6	- 1.6	- 1.6
					U2	5	- 3.8	- 3.8	- 3.8
Q2	E	0.0	2.0	0.0	U2	6	- 0.7	- 0.7	3.8
Q2	B	0.0	0.62	0.0	U2	7	0.0	0.0	0.0
Q2	C	9.9	0.0	9.2	U2	8	- 0.1	- 0.1	0.0
					U2	9	- 0.0	0.0	0.0
Q3	E	9.6	8.7	9.0	U2	12	- 0.7	- 0.7	4.0
Q3	B	9.6	8.7	8.4	U2	13	- 0.7	- 0.7	4.0
Q3	C	-1.8	-1.8	9.0	U2	14	- 13.0	- 13.0	- 13.0
Q4	E	0.0	0.0	0.0	U3	1	0.0	0.3	0.0
Q4	B	0.0	0.0	0.7	U3	2	0.0	0.63	0.0
Q4	C	9.6	8.8	0.0	U3	3	0.0	0.64	0.0
					U3	4	14.0	12.5	13.5
U1	1	0.0	2.0	0.0	U3	5	0.0	0.0	0.0
U1	2	0.0	2.0	0.0	U3	6	0.0	0.0	0.0
U1	3	0.0	2.0	0.0	U3	7	0.0	0.0	0.0
U1	4	0.0	2.0	0.0	U3	8	0.0	- 0.0	0.0
U1	5	0.0	5.6	0.0	U3	9	0.0	0.0	0.0
U1	6	0.0	0.0	0.0	U3	10	0.0	0.0	0.0
U1	7	0.0	0.0	0.0	U3	11	- 13.0	- 13.0	- 13.0
U1	8	0.0	0.0	0.0	U3	12	9.4	8.5	9.1
U1	9	0.0	0.8	0.0	U3	13	9.4	8.5	9.1
U1	10	0.0	5.6	0.0					

(e) Fm/cw/ssb detector circuit description, paragraph 3-27.

(f) Figure 7-20, fm/cw/ssb detector, location of components.

(g) Parts replacement guidelines, chapter 6, section II.

(h) Fm discriminator alignment, paragraph 6-6f.

q. Audio Amplifier (A4A10).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Signal generator
(b) Oscilloscope
(c) Two short lengths of coaxial cable with clip leads on one end (2)

(2) Audio amplifier checkout procedures. Perform the following actions in the sequence given. If any specified result

is not obtained, refer to paragraph 5-6q(3).

(a) Deenergize the receiver.

(b) Remove pc cards A4A6, A4A7, and A4A9.

(c) Set the rear panel R1-LINE AUDIO LEVEL potentiometer to mid-range and set the front panel PHONE LEVEL control fully clockwise.

(d) Connect the oscilloscope vertical input to A4XA10 pin 55 using a short coaxial cable with clip leads on one end. Connect the shield to if. motherboard ground plane.

(e) Connect the signal generator am. output to A4XA10 pin 51 using a short coaxial cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane.

(f) Set the signal generator modulation frequency to 400 Hz (internal modulation). Set the audio output level to 1.0 V rms.

(g) Energize the receiver and depress the DETECTION MODE-AM pushbutton. The oscilloscope should display a level of appx. 2 V p-p at appx. 400 Hz. The waveform should be a clean sine wave.

(h) Set the generator audio output level to 10 millivolts. Move the generator clip lead to A4XA10 pin 17.

(i) Use the oscilloscope lead to probe A4XA10 pin 13 and A4XA10 pin 11. The oscilloscope should display a level of appx. 2 V p-p at appx. 400 Hz on each pin.

(j) Connect the oscilloscope clip lead to A4XA10 pin 41. The oscilloscope should indicate a level of -0.3 Vdc.

(k) Set the generator audio output level to 0.1 V. Move the generator clip lead to A4XA10 pin 53.

(l) Move the oscilloscope clip lead to A4XA10 pin 19. The oscilloscope should display a level of appx. 2 V p-p at appx. 400 Hz.

(m) Deenergize the receiver and disconnect the test equipment.

(n) Reinstall pc cards A4A6, A4A7, and A4A9 in their proper slots.

(3) Audio amplifier fault isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the audio amplifier for normal operation by repeating the checkout procedure above.

(a) Figure 5-20, audio amplifier fault logic diagram.

(b) Table 5-14, audio amplifier voltage.

(c) Figure FO-13, audio amplifier schematic diagram.

(d) Audio amplifier circuit description, paragraph 3-28.

(e) Figure 7-21, audio amplifier, location of components.

(f) Parts replacement guidelines, chapter 6, section II.

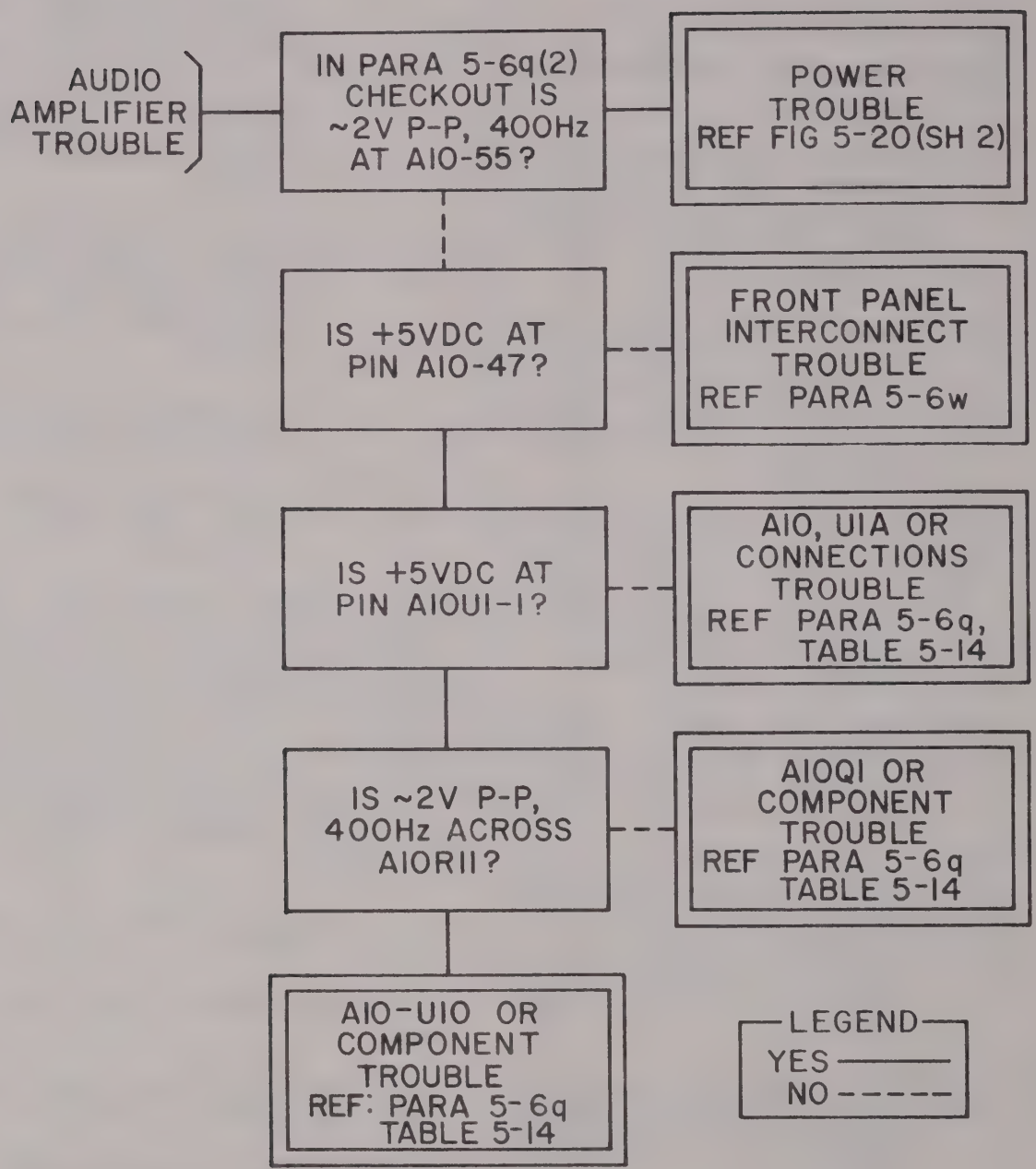

AUDIO AMPLIFIER TROUBLE
IN PARA 5-6q(2) CHECKOUT IS ~2V P-P, 400Hz AT A10-55?
POWER TROUBLE REF FIG 5-20(SH 2)
IS +5VDC AT PIN A10-47?
FRONT PANEL INTERCONNECT TROUBLE REF PARA 5-6w
IS +5VDC AT PIN A10U1-1?
A10, U1A OR CONNECTIONS TROUBLE REF PARA 5-6q, TABLE 5-14
IS ~2V P-P, 400Hz ACROSS A10R11?
A10Q1 OR COMPONENT TROUBLE REF PARA 5-6q TABLE 5-14
A10-U10 OR COMPONENT TROUBLE REF: PARA 5-6q TABLE 5-14
LEGEND
YES
NO

Figure 5-20. Audio Amplifier Fault Logic Diagram (Sheet 1 of 2)

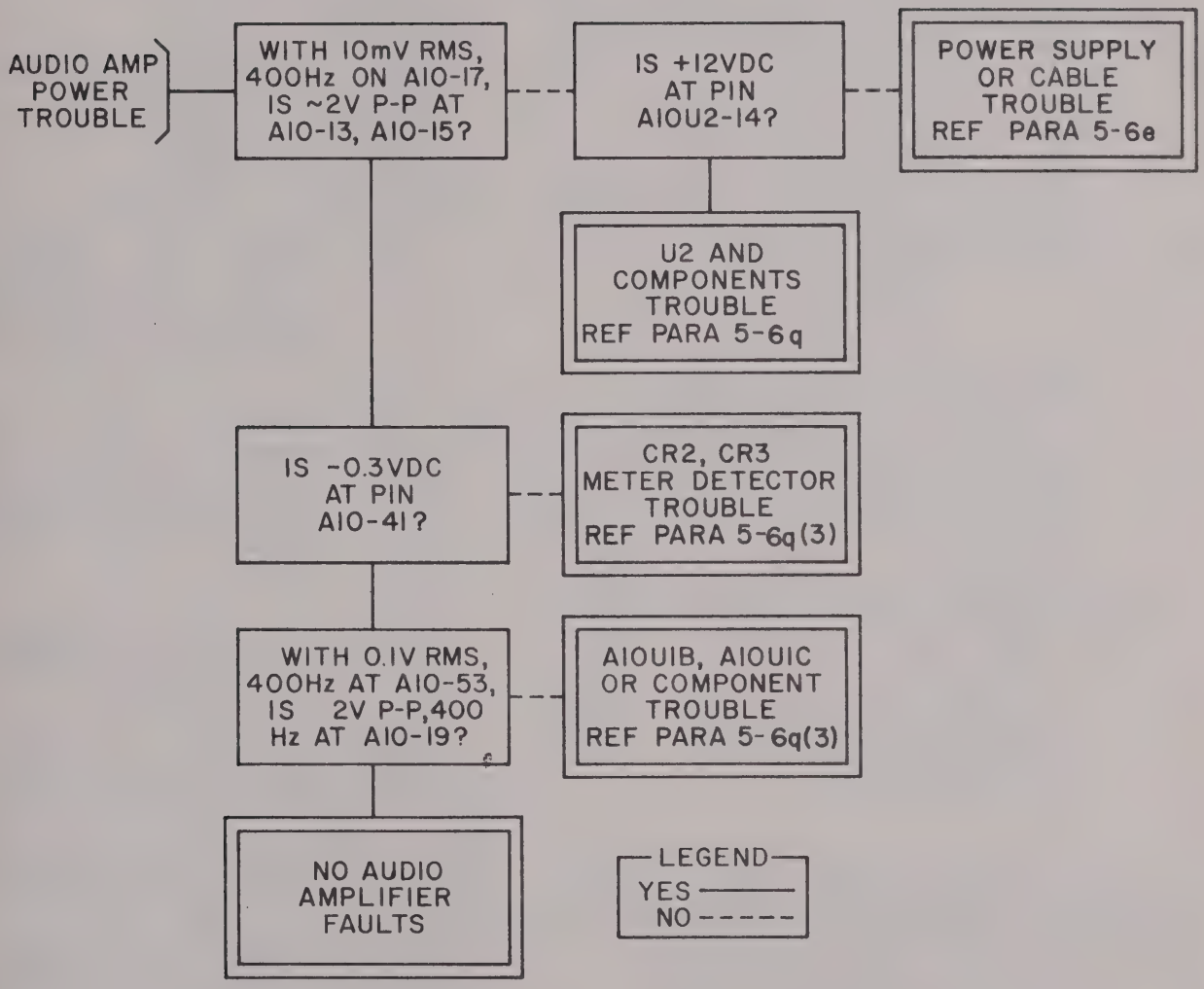

AUDIO AMP POWER TROUBLE
WITH 10mV RMS, 400Hz ON A10-17, IS ~2V P-P AT A10-13, A10-15?
IS +12VDC AT PIN A10U2-14?
POWER SUPPLY OR CABLE TROUBLE REF PARA 5-6e
U2 AND COMPONENTS TROUBLE REF PARA 5-6q
IS -0.3VDC AT PIN A10-41?
CR2, CR3 METER DETECTOR TROUBLE REF PARA 5-6q(3)
WITH 0.1V RMS, 400Hz AT A10-53, IS 2V P-P,400 Hz AT A10-19?
A10U1B, A10U1C OR COMPONENT TROUBLE REF PARA 5-6q(3)
NO AUDIO AMPLIFIER FAULTS
LEGEND
YES
NO

Figure 5-20. Audio Amplifier Fault Logic Diagram (Sheet 2 of 2)

Table 5-14. Audio Amplifier Voltage

Component	Pin	Am. mode active	Other modes active
Q1	S	0.0	0.0
	D	0.0	0.0
	G	0.0	- 13
U1	1	+ 14	- 14
	2	+ 1.6	+ 1.6
	3	+ 5	0.0
U2	2	+ 6	+ 6
	13	+ 6	+ 6

r. 1st Lo Synthesizer (A5A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Frequency counter
(b) Wideband oscilloscope
(c) Rf voltmeter
(d) 50-ohm probe

(2) 1st lo synthesizer checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6r(3).

(a) Deenergize the receiver.

(b) Disconnect W2P3 from A1 2.

(c) Connect the frequency counter to W2P3.

(d) Energize the receiver and tune it to 00.00000 MHz. The frequency counter should indicate 171.64 MHz.

(e) Rotate the tuning knob counterclockwise and tune the receiver to 29.99999 MHz. The frequency counter should indicate 291.60 MHz.

(f) Disconnect the frequency counter and connect the rf voltmeter and the 50-ohm probe to W2P3. The voltmeter should indicate +20 dBm ±2 dBm.

(g) Deenergize the receiver and disconnect the test equipment. Reconnect W2P3.

(3) 1st lo synthesizer fault isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph 5-6r(4) will aid in tracing the fault to a defective component or connection.

(a) Vco band select circuitry. Use table 5-15 to check for proper operation of U13, diodes CR8 through CR10, and Q1 through Q3, while dialing different frequencies on the front panel.

(b) Divider section. With the receiver tuned to 00.00000 MHz, or an input at J1 of the 1st and 3rd lo of 171.64 MHz, the frequencies in table 5-16 should be found at the corresponding ic pins using a digital frequency counter.

Table 5-15. Vco Band Select Code

Tuned frequency	Band select output (Vdc)		
	E3	E2	E1
0.00 - 3.99 MHz	+ 15	+ 15	+ 15
4.00 - 7.99 MHz	+ 15	+ 15	- 12
8.00 - 11.99 MHz	+ 15	- 12	+ 15
12.00 - 15.99 MHz	+ 15	- 12	- 12
16.00 - 19.99 MHz	- 12	+ 15	+ 15
20.00 - 23.99 MHz	- 12	+ 15	- 12
24.00 - 27.99 MHz	- 12	- 12	+ 15
28.00 - 29.99 MHz	- 12	- 12	- 12

Table 5-16. 1st Lo Frequency Chart

IC	Pin	Freq (Hz)	IC	Pin	Freq (Hz)
U1	7	17 MHz	U9	7	1.68 MHz
U1	9	3.4 MHz	U9	9	80 kHz
U1	10	40 kHz	U9	15	40 kHz
U2	12	3.4 MHz	U10	7	840 kHz
U3	7	40 kHz	U10	7	200 kHz
U3	9	40 kHz	U11	6	40 kHz
U6	3	40 kHz	U11	7	40 kHz
U8	7	340 kHz	U12	5	40 kHz
U9	1	40 kHz	U12	9	40 kHz

(c) Phase detector U5. Check for a 40 kHz signal at input pin 3 of U5. If a signal is not present, troubleshoot the time base circuits. See paragraph 5-6t. Check for a 40 kHz signal at pin 1 of U5. If it is not present, troubleshoot the 1st lo counter circuits. Refer to paragraph 3-36a and figure 3-12 for an explanation of the function of the phase detector.

(d) 1st lo vco. The 1st lo vco is located on the 1st and 3rd lo synthesizer pc board. It is recommended that the circuit description of the vco be read before troubleshooting (paragraph 3-36b). The frequency of the oscillator, Q1, is controlled by the band select code and the tuning voltage. The correct vco output frequency can be found by adding 42.91 MHz to the tuned frequency in table 5-15 and multiplying the result by 4.

(4) 1st lo synthesizer supplementary fault isolation data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the 1st lo synthesizer for normal operation by repeating the checkout procedure in paragraph 5-6r(2).

(a) Figure FO-16, 1st and 3rd lo synthesizer/time base schematic diagram and figure FO-14, 1st and 3rd lo synthesizer schematic diagram.

(b) 1st lo synthesizer circuit description, paragraph 3-36.

(c) Figure 7-23, 1st and 3rd lo synthesizer, location of components and figure 7-26, 1st and 3rd lo/time base, location of components.

(d) Parts replacement guidelines, chapter 6, section II, repair.

(e) 1st lo synthesizer alignment procedure, paragraph 6-7a.

s. 3rd Lo Synthesizer (A5A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Frequency counter
(b) Wideband oscilloscope
(c) Rf voltmeter
(d) 50-ohm probe

(2) 3rd lo synthesizer checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6s(3).

(a) Deenergize the receiver.

(b) Disconnect W6P10 from J7.

(c) Connect the frequency counter to W6P10.

(d) Energize the receiver. The frequency counter should indicate 11.155 MHz.

(e) Disconnect the frequency counter and connect the rf voltmeter and the 50-ohm probe to W6P10. The voltmeter should indicate -6 dBm ±2 dBm.

(f) Deenergize the receiver and disconnect the test equipment. Reconnect W6P10.

(3) 3rd lo synthesizer fault isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph 5-6s(3)(d), will aid in tracing the fault to a defective component or connection. Ensure the following inputs to the 3rd lo synthesizer circuitry are correct. If not, check the time base circuits. Refer to time base (A5A1A2) paragraph 5-6t.

(a) 50 kHz signal at pin 11 of U21.

(b) 10 kHz signal at pin 12 of U21.

(c) Verify that the time for two input waveforms at pin 3 of U21 equals one output waveform at pin 5 of U21. If not, replace U21.

(d) Observe the input (pins 1 and 3) and output (pins 2 and 13) voltages of U22 and compare them to figure 5-21. If a difference exists, replace U22. A normal value for the output (pin 8) is 2.0 to 3.0 Vdc.

(e) Measure the dc level at pin 9 of U22. A level of approximately 3.0 Vdc indicates proper alignment of C33. Refer to paragraph 6-7d.

(f) If problems lead to the vco, see the vco circuit description, paragraph 3-33c(2) and troubleshoot that component.

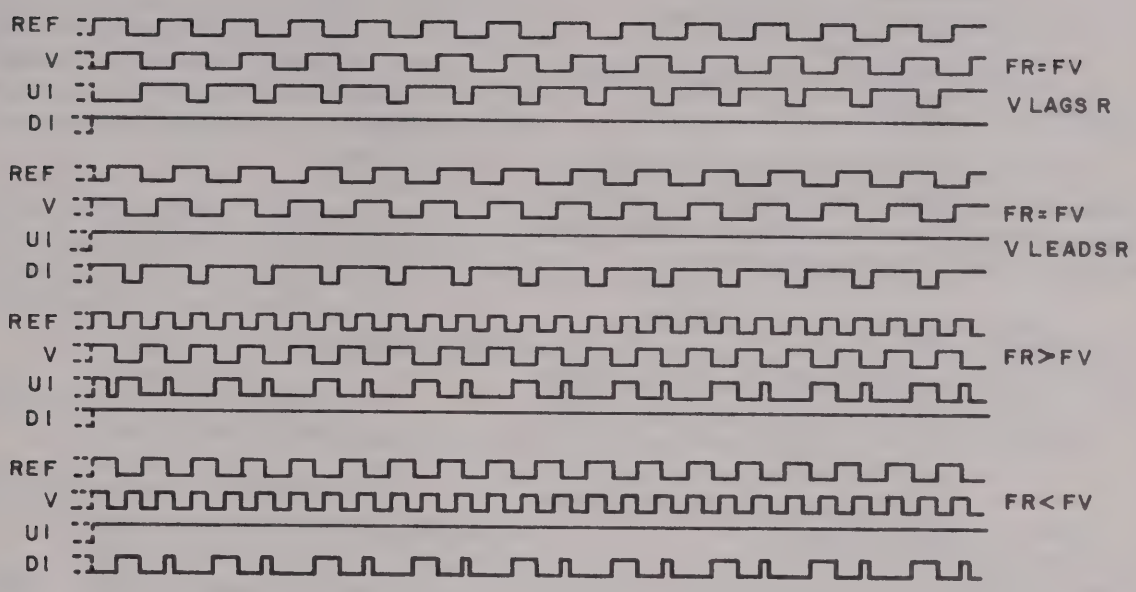


Figure 5-21. Phase Detector Timing Diagram

(4) 3rd lo synthesizer supplementary fault isolation data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the 3rd lo synthesizer for normal operation by repeating the checkout procedure in paragraph 5-6s(2).

(a) Figure FO-16, 1st and 3rd lo synthesizer/time base schematic diagram.

(b) 3rd lo synthesizer circuit description, paragraph 3-33c.

(c) Figure 7-26, 1st and 3rd lo synthesizer/time base, location of components.

(d) Parts replacement guidelines, chapter 6, section II, repair.

(e) 3rd lo synthesizer alignment procedure, paragraph 6-7d.

t. Time Base (A5A1A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Frequency counter
(b) Wideband oscilloscope or
(c) Digital counter
(d) Short length of coaxial cable with clip leads on one end

(2) Time base checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6t(3).

(a) Deenergize the receiver.

(b) Connect the frequency counter input to A5XA1 pin A9 using a short coaxial cable with clip leads on one end. Connect the cable shield to the motherboard ground plane.

(c) Energize the receiver. The frequency counter should read 1.000000 MHz ±3 Hz.

(d) Move the frequency counter clip lead to A5XA1 pin A47. The counter should read 10.000 kHz ±1 Hz.

(e) Move the frequency counter clip lead to A5XA1 pin A53. The counter should read 1.000 kHz ±1 Hz.

(f) Move the frequency counter clip lead to test point A5A1A2 pin E6. The counter should read 40.000 kHz ±1 Hz.

(g) Deenergize the receiver and disconnect the test equipment.

(3) Time base fault isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph 5-6t(4) will aid in tracing the fault to a defective component or connection. Using the internal frequency source, the frequencies in table 5-17 should be found at the corresponding ic pins.

(4) Time base supplementary fault isolation data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the time base for normal operation by repeating the checkout procedure in paragraph 5-6t(2).

(a) Figure FO-16, 1st and 3rd lo synthesizer/time base schematic diagram.

(b) Paragraph 3-33, time base circuit description.

(c) Figure 7-26, 1st and 3rd lo/time base, location of components.

(d) Parts replacement guidelines, chapter 6, section II, repair.

(e) Paragraph 6-7e, 2 MHz time base alignment.

u. 2nd Lo Synthesizer (A5A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Frequency counter
(b) Wideband oscilloscope or
(c) Rf voltmeter
(d) 50-ohm probe

(2) 2nd Lo synthesizer checkout procedure. Perform the following actions in the sequence given. If a specified result is not obtained, refer to paragraph 5-6u(3).

(a) Deenergize the receiver.

Table 5-17. Time Base Frequency Chart

Ic	Pin	Frequency	Ic	Pin	Frequency
U15	5	1 MHz	U18	12	10 kHz
U15	6	1 MHz	U19	5	250 kHz
U15	8	2 MHz	U19	12	50 kHz
U15	12	200 kHz	U20	5	5 kHz
U17	12	40 kHz	U20	12	1 kHz
U18	5	500 kHz	U23	8	1 MHz
U18	8	1 MHz	U23	11	1 MHz

(b) Disconnect connector W4P4 from A2J1.

(c) Connect the frequency counter to P4.

(d) Energize the receiver and tune to 00:00000 MHz. The frequency counter should indicate 32.21 MHz.

(e) Tune the receiver to 00.00999 MHz. The frequency counter should indicate 32.20 MHz.

(f) Disconnect the frequency counter and connect the rf voltmeter and the 50-ohm probe to W4P4. The voltmeter should indicate 0 dBm ±2 dBm.

(g) Deenergize the receiver and disconnect the test equipment. Reconnect P4.

(3) 2nd Lo synthesizer fault isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph 5-6u(4) will aid in tracing the fault to a defective component or connection.

(a) Determine which of the phase lock loops is causing the problem. When the problem loop is determined, troubleshoot as described below.

1 32 MHz loop. Check for a 32 MHz signal on the transistor case (or collector) of Q1. If not present, proceed to step (b) below.

2 Programmable loop. Check for a 200 kHz signal at pin 1 of U6 when the receiver is tuned to 15.00999 MHz and a 210 kHz signal at pin 1 of U6 when the receiver is tuned to 15.00000 MHz. Illumination of LED CR1 indicates a faulty loop. If faulty, proceed to paragraph 5-6u(3)(c). If a problem is not detected, proceed to step 3 below.

3 Output loop. Troubleshooting this loop is required when no problems exist in the two loops tested above and 32.20 to 32.21 MHz is not seen at module pin B15. If this is the case, proceed to paragraph 5-6u(3)(d).

(b) 32 MHz loop.

1 U3 and U2. U3 is a divide-by-2 counter. The time for two input waveforms at pin 3 of U3 equals the time for one output waveform at pin 5 of U3. If not, determine that the input levels are correct for TTL (low state less than 0.8 V,

high state greater than 2.0 V). If these levels do exist and the output is not correct, replace U3. U2 is a divide-by-16 counter. The time for 16 input waveforms at pin 8 of U2 equals the time for one output waveform at pin 12 of U2. If not, replace U2.

2 See paragraph 5-6t. Assure the proper operation of phase detector U1. Check the 1 MHz reference at pin 1 of U1. If wrong or no signal, troubleshoot the time base circuits. A working voltage may vary from +2.0 to +3.5 Vdc (at pin 8 of U1).

3 Adjust capacitor C51 (inside the shielded unit) until +2.7 Vdc (nominal) is seen at test point E1, with the tuning tool withdrawn from the shield. If +2.7 Vdc cannot be obtained, troubleshoot phase detector or 32 MHz vco.

(c) Programmable loop.

1 U19, U17 and U16. The time for one waveform at pin 5 of U19 equals 10 waveforms at pin 6 of U19. If not, replace U19. The time for one waveform at pin 12 of U17 equals 10 waveforms at pin 8 of U17. If not, replace U17. The time for one waveform at pin 7 of U16 equals 10 waveforms at pin 15 of U16 (difficult to read with the oscilloscope since the frequency at pin 15 varies from 200 - 210 MHz). If not, replace U16.

2 Operation of the ÷100/÷101 prescaler. Tune the receiver to 15.00999 MHz. The time for 10 input waveforms at pin 2 of U14 equals one output waveform at pin 11 of U14. If not, replace U14.

3 Operation of counters. Tune the receiver to 15.00000 MHz. This sets all inputs (A, B, C, and D) to U7, U8 and U9 with 0 Vdc. Using a frequency counter the frequencies in table 5-18 should be found at the corresponding pins. If not, replace that ic.

4 Phase detector U12. Check for 10 kHz signal at pin 1 of U12. If incorrect or no signal, troubleshoot the time base circuits. Compare inputs (pins 1 and 3) and outputs (pins 2 and 13) to figure 5-21 of the 1st lo troubleshooting test.

Table 5-18. 2nd Lo Frequency Chart

Ic pin	Frequency	Ic pin	Frequency
U7 Pin 14	2.09 MHz	U9 Pin 3	1.05 MHz
U7 Pin 13	100 kHz	U9 Pin 13	130 kHz
U8 Pin 4	100 kHz	U10 Pin 14	130 kHz
U8 Pin 13	10 kHz	U10 Pin 12	10 kHz
U9 Pin 14	2.09 MHz	U10 Pin 11	10 kHz

5 Tune the receiver to 15.00499 MHz. Spread or compress the turns of coil L8 until 4.0 Vdc is seen at test point E3. Recheck the voltage at test point E3 to be certain that it remains between +2.0 Vdc and +6.5 Vdc as the receiver is tuned from 15.00000 to 15.00999 MHz. If these voltages cannot be obtained, troubleshoot the vco.

6 If the radio does not tune in its range, the problem is in the programmable vco. See paragraph 3-35e, and troubleshoot that circuit.

(d) Output loop.

1 Measure the frequency of the output at module pin B15. If no signal is present, there is a problem in the vco or its output amplifier. Check gate 1 of Q3 (pin 3) for signal. If there is none, the problem is with the vco circuit of Q6. If the signal is there, the problem is in the circuit of amplifier Q3. If the signal is present at pin B15, adjust C61 to bring it as close as practical to 32.200 MHz. If C61 cannot be adjusted satisfactorily, replace.

2 With the vco frequency very near 32.200 MHz, check the signals at pins 1 and 3 of U6. Both should be TTL level signals of approximately 200 kHz (that is, low less than 0.8 V and high greater than 2.0 V). If the wrong signal is at pin 1, troubleshoot the programmable loop, paragraph 5-6u(c). If the wrong signal is at pin 3, continue.

3 Check the base of Q2. The signal there should be roughly sinusoidal and about 0.5V p-p. If so, the problem is in the circuits of U4 and U5.

NOTE

Because of the low signal levels at the inputs of U4 and U5, signal tracing is difficult. The signal at U4 pin 1 should be 32.2 MHz, at U4 pin 7 should be 32.0 MHz, and U5 pins 1 and 2 should be 200 kHz. Grounding of the scope probe is critical if the true signal is to be isolated. It is more likely that careful visual inspection of these circuits and a few voltage checks will be useful.

4 The voltage at pins 1 and 2 of U15 will be approximately +5V and must be equal within 0.2 Vdc. If they differ by more than this, replace U4. If the 200 kHz at pins 1 and 2 of U5 can be measured, the output at pin 6 should be amplified by about 10 times from that level. There may be some distortion present at the output of U5 which is reduced at the base of Q2.

5 If the signals at pins 1 and 3 of U6 both appear correct, compare its outputs at pins 2 and 13 with those of figure 5-21. If these appear correct, the problem must be in the amplifier section of U6 pins 8 and 9 and its connection to the vco.

(4) 2nd lo synthesizer supplementary fault isolation data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the 2nd lo synthesizer for normal operation by repeating the checkout procedure in paragraph 5-6u(2).

(a) Figure FO-17, 2nd lo synthesizer schematic diagram.

(b) Paragraph 3-35, 2nd lo synthesizer circuit description.

(c) Figure 7-27, 2nd lo synthesizer, location of components.

(d) Parts replacement guidelines, chapter 6, section II, repair.

(e) Paragraph 6-7b, 2nd lo synthesizer alignment.

v. Bfo Synthesizer (A5A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 1-3 for specifics.

(a) Frequency counter
(b) Wideband oscilloscope
(c) Short length of coaxial cable with clip leads on one end

(2) Bfo synthesizer checkout procedures. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6v(3).

(a) Deenergize the receiver.

(b) Disconnect connector W7P11 from J8.

(c) Connect the frequency counter to W7P11.

(d) Energize the receiver and depress the DETECTION MODE-CW pushbutton.

(e) Set the bfo offset to +0.0 kHz. The frequency counter should read 455.000 kHz.

(f) Set the bfo offset first to +8.9 kHz and then to -8.9 kHz. The frequency counter should read 463.900 kHz and 446.1 kHz respectively.

(g) Disconnect the frequency counter and reconnect W7P11 to J8.

(h) Connect the oscilloscope input to A4TP15 (A4XA8-18) using a shielded cable with clip leads on one end. Connect the cable shield to the if. motherboard ground plane. The oscilloscope should display a level of appx. 120 mV p-p at appx. 446.1 kHz.

(i) Deenergize the receiver and disconnect the test equipment.

(3) Bfo synthesizer fault isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph 5-6v(4), will aid in tracing the fault to a defective component or connection.

(a) Set the front panel bfo offset thumbwheel switches to +0.0.

(b) In the programmable circuits, if a 1 kHz signal is not seen entering the phase detector, pin 3 of U9, check that the frequencies in table 5-19 are found at their corresponding ic pins. If a problem is detected, troubleshoot and/or replace the ic from which the signal originates.

(c) Phase detector U9.

1 1 kHz signal should be seen at pin 1 of U9. If not, troubleshoot the time base circuits. Refer to paragraph 5-6t.

Table 5-19. Bfo Frequency Chart

Ic	Pin	Freq	Ic	Pin	Freq	Ic	Pin	Freq
U1	2	910 kHz	U2	2	91 kHz	U3	2	9 kHz
U1	3	2.275 MHz	U2	3	228 kHz	U3	3	23 kHz
U1	4	0	U2	4	455 kHz	U3	4	46 kHz
U1	6	455 kHz	U2	6	46 kHz	U3	6	5 kHz
U1	7	455 kHz	U2	7	46 kHz	U3	7	5 kHz
U1	11	1 kHz	U2	11	1 kHz	U3	11	1 kHz
U1	14	4.55 MHz	U2	14	4.55 MHz	U3	14	4.55 MHz
U4	2	1 kHz	U5	2	1 kHz	U6	10	27 kHz
U4	3	3 kHz	U5	4	1 kHz	U6	11	24 kHz
U4	4	5 kHz	U5	5	5 kHz	U6	12	12 kHz
U4	6	1 kHz	U5	6	5 kHz	U6	13	13 kHz
U4	7	1 kHz	U6	1	5 kHz	U7	1	455 kHz
U4	11	1 kHz	U6	2	46 kHz	U7	2	455 kHz
U4	14	4.55 MHz	U6	3	12 kHz	U7	4	910 kHz
U5	8	27 kHz	U6	4	228 kHz	U7	5	2.275 kHz
U5	9	9 kHz	U6	5	455 kHz	U7	6	455 kHz
U5	10	23 kHz	U6	6	24 kHz	U7	8	4.55 kHz
U5	12	46 kHz	U6	8	1 kHz	U7	9	4.55 kHz
U5	13	91 kHz	U6	9	1 kHz	U8	2	1 kHz

2 A voltage level of appx. +1.25 Vdc should be seen at pin 10 of U9. If the voltage level is less than +1.00 Vdc or greater than +1.50 Vdc, replace U9.

3 Adjust capacitor C8 until a +2.7 Vdc level is seen at module pin 7. If +2.7 volts cannot be achieved, replace Q4.

(d) Troubleshoot amplifier Q2 and sine wave to TTL converter Q3 when the signal from the vco through capacitor C10 is not amplified at the collector of Q3. Refer to the circuit description for these circuits, paragraph 3-34.

(e) Output divider U10. Use table 5-20 to check the operation of U10 with the front panel bfo offset switches set to +0.0.

(4) Bfo synthesizer supplementary fault isolation data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the bfo synthesizer for normal operation by repeating the checkout procedure in paragraph 5-6v(2).

(a) Figure FO-18, bfo synthesizer, schematic diagram.

(b) Paragraph 3-34, bfo synthesizer, circuit description.

(c) Figure 7-28, bfo synthesizer, location of components.

(d) Parts replacement guidelines, chapter 6, section II, repair.

(e) Paragraph 6-7f, bfo synthesizer alignment.

Table 5-20. Output Divider U10 Frequency Chart

IC	Pin	Freq
U10	1	4.55 MHz
U10	11	910 kHz
U10	12	455 kHz
U10	14	910 kHz

w. Front Panel Interconnect (A6A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter will be required for this test, see table 1-3 for specifics.

(2) Front panel interconnect checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6w(3).

(a) Deenergize the receiver.

(b) Connect the common (-) input of the digital voltmeter to chassis ground using a short test lead.

(c) Energize the receiver.

(d) Refer to tables 5-21 and 5-22. Depress the indicated DETECTION MODE and IF BANDWIDTH kHz pushbuttons in succession. For each button selected, use the voltmeter positive (+) test lead to probe for high ($\geq$+2.5 Vdc) or low ($\leq$+0.5 Vdc) conditions as indicated.

(e) Deenergize the receiver and disconnect the test equipment.

(3) Front panel interconnect fault isolation. The items listed below are provided as an aid in fault isolation. Use schematic diagram figure FO-1, sheet 3, to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the front panel interconnect for normal operation by repeating the checkout procedure in paragraph 5-6w(2).

(a) Figure FO-1, sheet 3, Receiving Set Radio AN/URR-74(V)2 main chassis schematic diagram.

(b) Front panel interconnect circuit description, paragraph 3-48.

(c) Figure 7-31, front panel interconnect, location of components.

(d) Parts replacement guidelines, chapter 6, section II.

x. Lower Panel Control (A10A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, refer to table 1-3 for specifics.

(a) Signal generator
(b) Oscilloscope
(c) Short length of coaxial cable with clip leads on one end (2)

(2) Lower panel control checkout procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-6x(3).

(a) Deenergize the receiver.

Table 5-21. Front Panel Detection Mode Interconnect Voltage

Pin No.	Detection mode					
	Am	Cw	Fm	Usb	Lsb	Isb
A6XA2-5	Low	Low	Low	Low	High	Low
A6XA2-3	Low	Low	Low	High	Low	Low
A6XA2-1	Low	Low	Low	Low	Low	High
A6XA2-18	Low	High	Low	High	High	High
A6XA2-16	Low	Low	High	Low	Low	Low
A6XA2-48	High	Low	Low	Low	Low	Low
A6XA2-58	High	High	High	Low	Low	Low
A6XA2-60	High	Low	High	Low	Low	Low
A10J1-22	High	High	High	Low	Low	Low
A10J1-37	High	High	High	Low	Low	Low
A10J1-16	High	High	High	Low	Low	Low

Table 5-22. Front Panel Bandwidth Interconnect Voltage

Pin No.	If. Bandwidth kHz					Detection mode
	16 kHz	6 kHz	3.2 kHz	1 kHz	.3 kHz	Usb/Lsb/Isb
A6XA2-49	High	High	High	Low	Low	Low
A6XA2-51	High	Low	Low	High	High	High
A6XA2-53	Low	High	Low	Low	Low	Low
A6XA2-55	Low	Low	High	Low	Low	Low
A6XA2-47	Low	Low	Low	High	Low	Low
A6XA2-45	Low	Low	Low	Low	High	Low

(b) Remove the front panel and gently pull it out several inches from the receiver main chassis, being careful not to place any strain on the interconnecting cables. Refer to paragraph 6-10.

(c) Connect the oscilloscope vertical input to connector A10A2J3 using a short coaxial cable with clip leads on one end. Connect the cable shield to terminal A10A2E1.

(d) Connect the signal generator am. output to terminal A10A2E9 using a short coaxial cable with clip leads on one end. Connect the cable shield to terminal A10A2E1.

(e) Set the signal generator modulation frequency to 400 Hz. Set the audio level to 70 millivolts and the receiver's S2 CLOCK switch to INT.

(f) Energize the receiver and rotate the PHONE LEVEL controlfully clockwise. The oscilloscope should display a level of appx. 20 V p-p. The waveform should be a clean sine wave.

(g) Move the signal generator output lead to terminal A10A2E3 and move the oscilloscope input lead to connector A10A2-J2. The oscilloscope should display a level of appx. 20 V p-p. The waveform should be a clean sine wave.

(h) Deenergize the receiver and disconnect the test equipment.

(i) Reinstall front panel. Refer to paragraph 6-10.

(3) Lower panel control fault isolation. The items listed below are provided as an aid in fault isolation. Use the schematic diagram figure FO-1, sheet 4, to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the lower panel control for normal operation by repeating the checkout procedure above.

(a) Figure FO-1, sheet 4, Receiving Set Radio AN/URR-74(V)2 main chassis schematic diagram.

(b) Lower panel control circuit description, paragraph 3-52b.

(c) Figure 7-38, lower panel control, location of components.

(d) Parts replacement guidelines, chapter 6, section II.

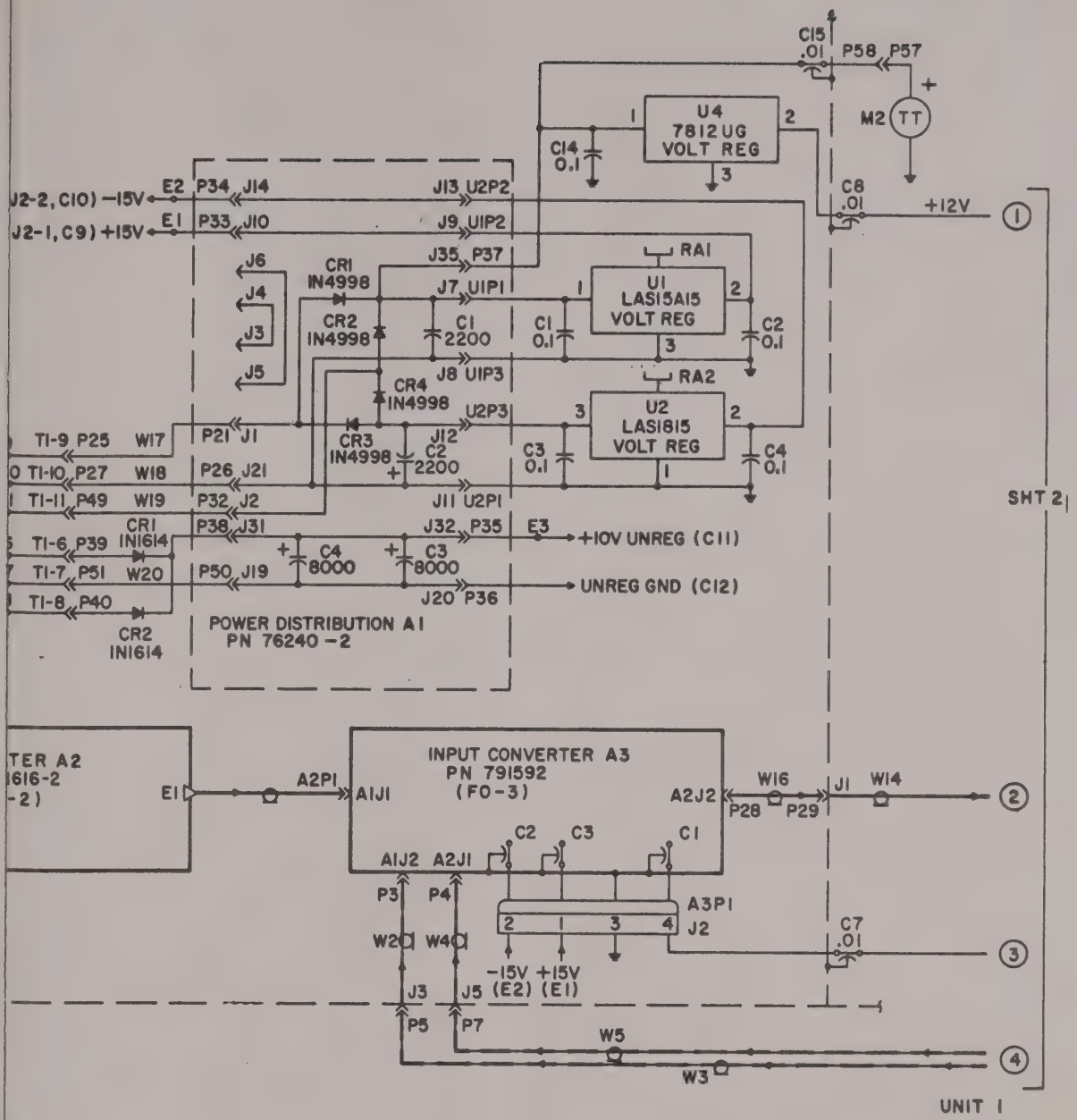


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 1 of 5)

(g) Move the signal generator output lead to terminal A10A2E3 and move the oscilloscope input lead to connector A10A2-J2. The oscilloscope should display a level of appx. 20 V p-p. The waveform should be a clean sine wave.

(h) Deenergize the receiver and disconnect the test equipment.

(i) Reinstall front panel. Refer to paragraph 6-10.

(3) Lower panel control fault isolation. The items listed below are provided as an aid in fault isolation. Use the schematic diagram figure FO-1, sheet 4, to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the lower panel control for normal operation by repeating the checkout procedure above.

(a) Figure FO-1, sheet 4, Receiving Set Radio AN/URR-74(V)2 main chassis schematic diagram.

(b) Lower panel control circuit description, paragraph 3-52b.

(c) Figure 7-38, lower panel control, location of components.

(d) Parts replacement guidelines, chapter 6, section II.

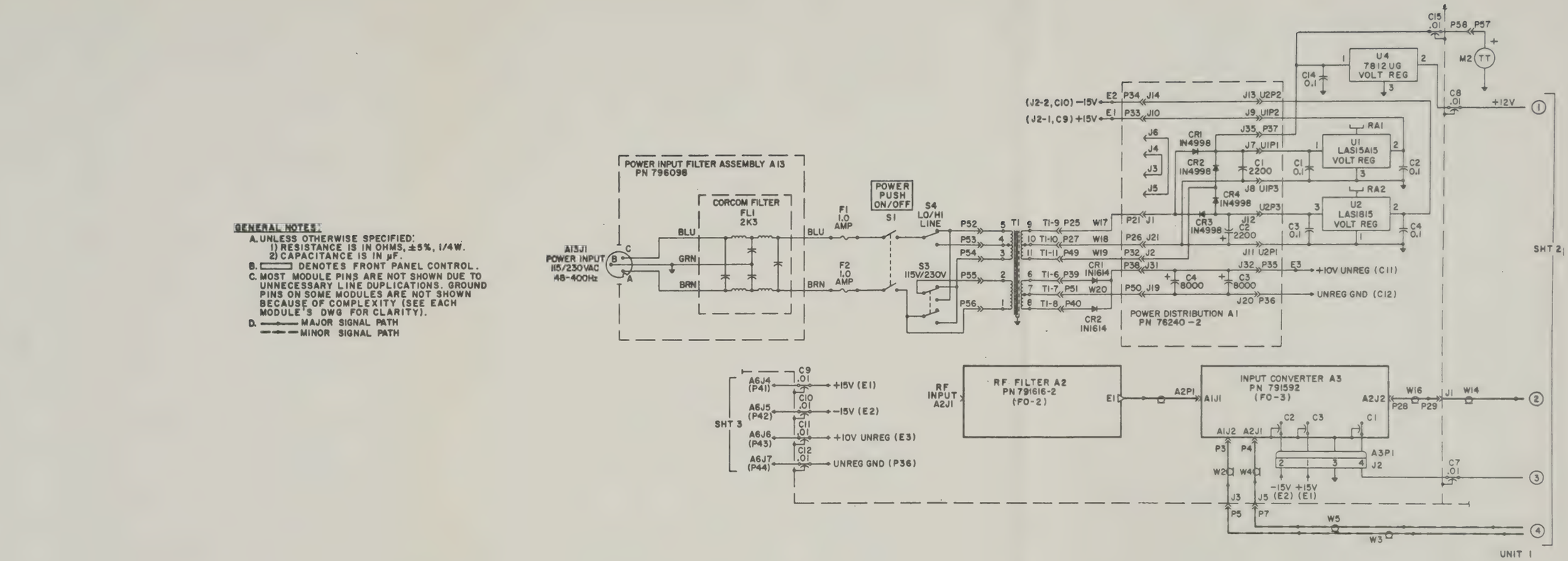
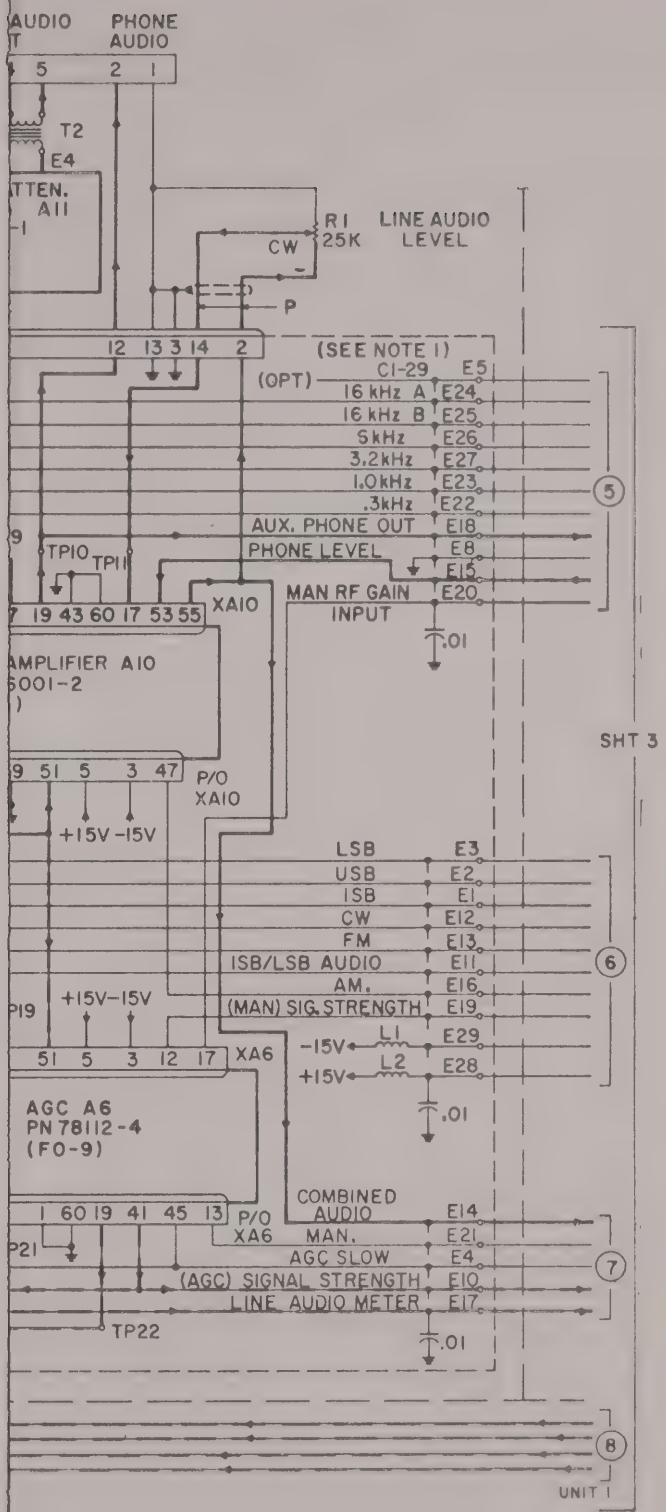


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 1 of 5)



t Radio AN/URR-74(V)2 Main Chassis (Unit 1),
iagram (Sheet 2 of 5)

SPECIFIC NOTES:

1. EACH CAPACITOR REFERENCE NUMBER IS IDENTICAL TO EACH "E" NUMBER. SPARE CAPACITORS & "E" NUMBERS ARE NOT SHOWN (E6, E7, E9, C6, C7, AND C9 NOT USED).
2. TEST POINT DESCRIPTIONS:

A4 —
- TP1 10.7 MHz INHIBIT
- TP2 10.7 MHz FILTER SW IF. OUTPUT
- TP3 455 kHz FILTER SW IF. OUTPUT
- TP4 455 kHz AMPLIFIER OUTPUT
- TP5 DETECTED AM.
- TP6 IF. INPUT TO FM/CW/SSB DETECTOR
- TP7 FM/CW AUDIO
- TP8, TP9 } LINE AUDIO
- TP10 PHONE AUDIO
- TP11 LINE AUDIO LEVEL
- TP12 3RD LO INPUT TO 10.7 MHz/455 kHz CONVERTER
- TP13 10.7 MHz/455 kHz CONVERTER IF. OUTPUT
- TP14 ISB IF. OUTPUT
- TP15 BFO INPUT
- TP16, TP17, TP18 } ISB AUDIO
- TP19 IF. AGC
- TP20 NOT USED
- TP21 ISB AGC
- TP22 RF AGC

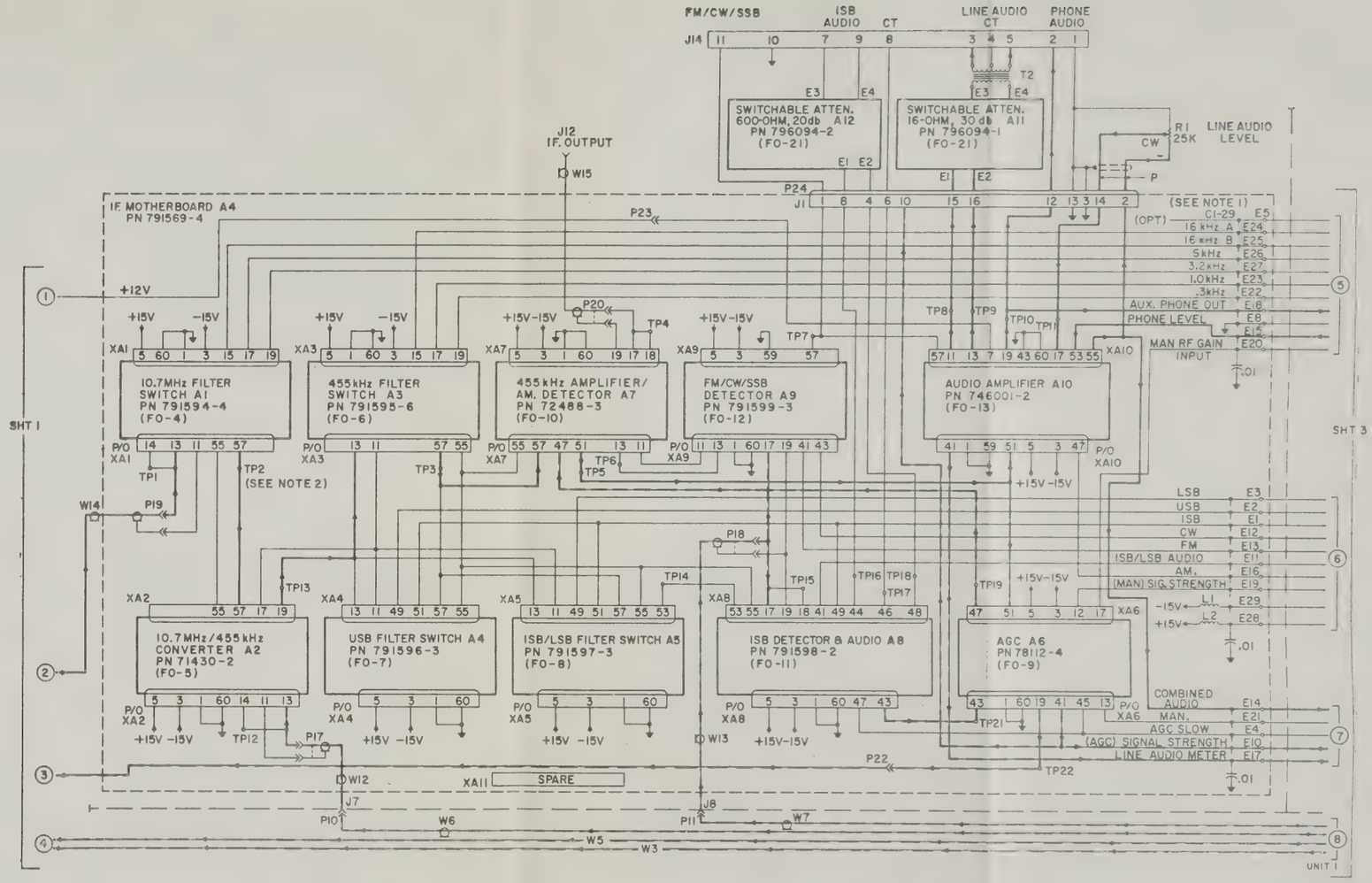
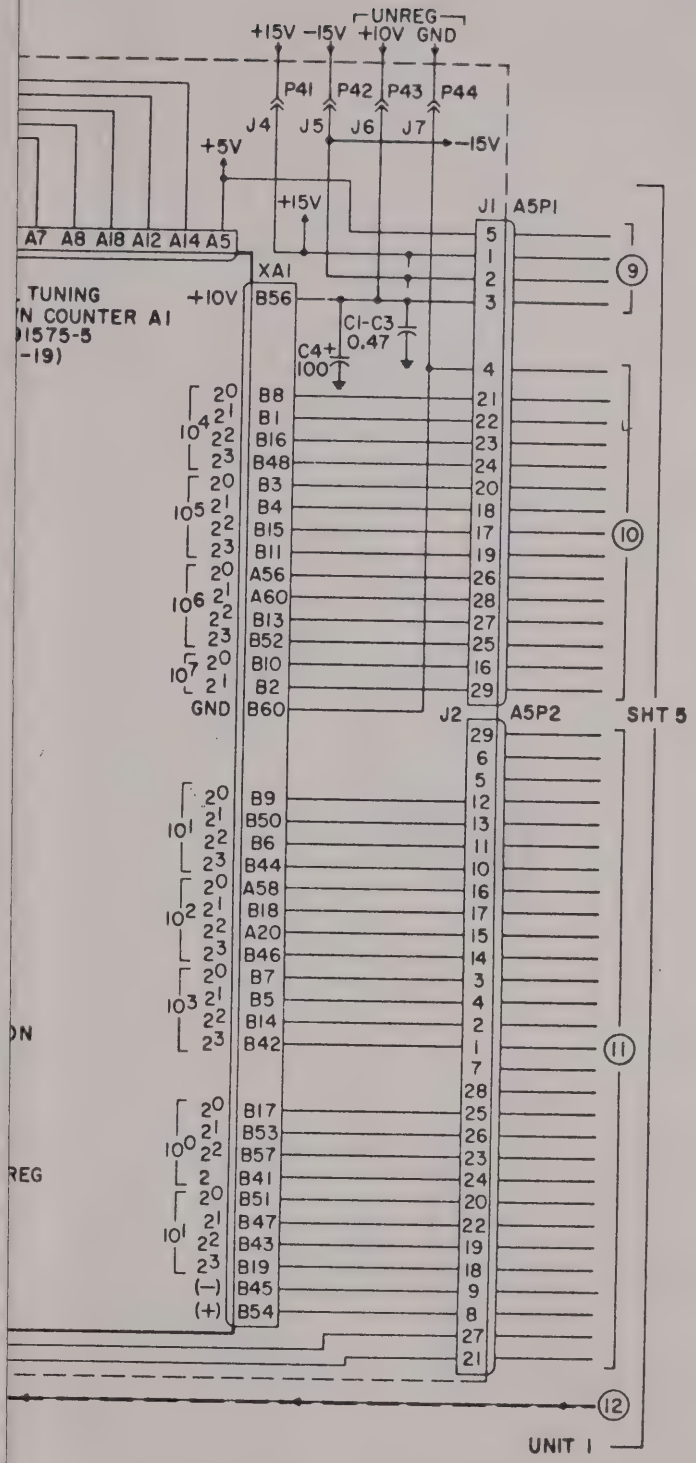


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 2 of 5)



t Radio AN/URR-74(V)2 Main Chassis (Unit 1),
iagram (Sheet 3 of 5)

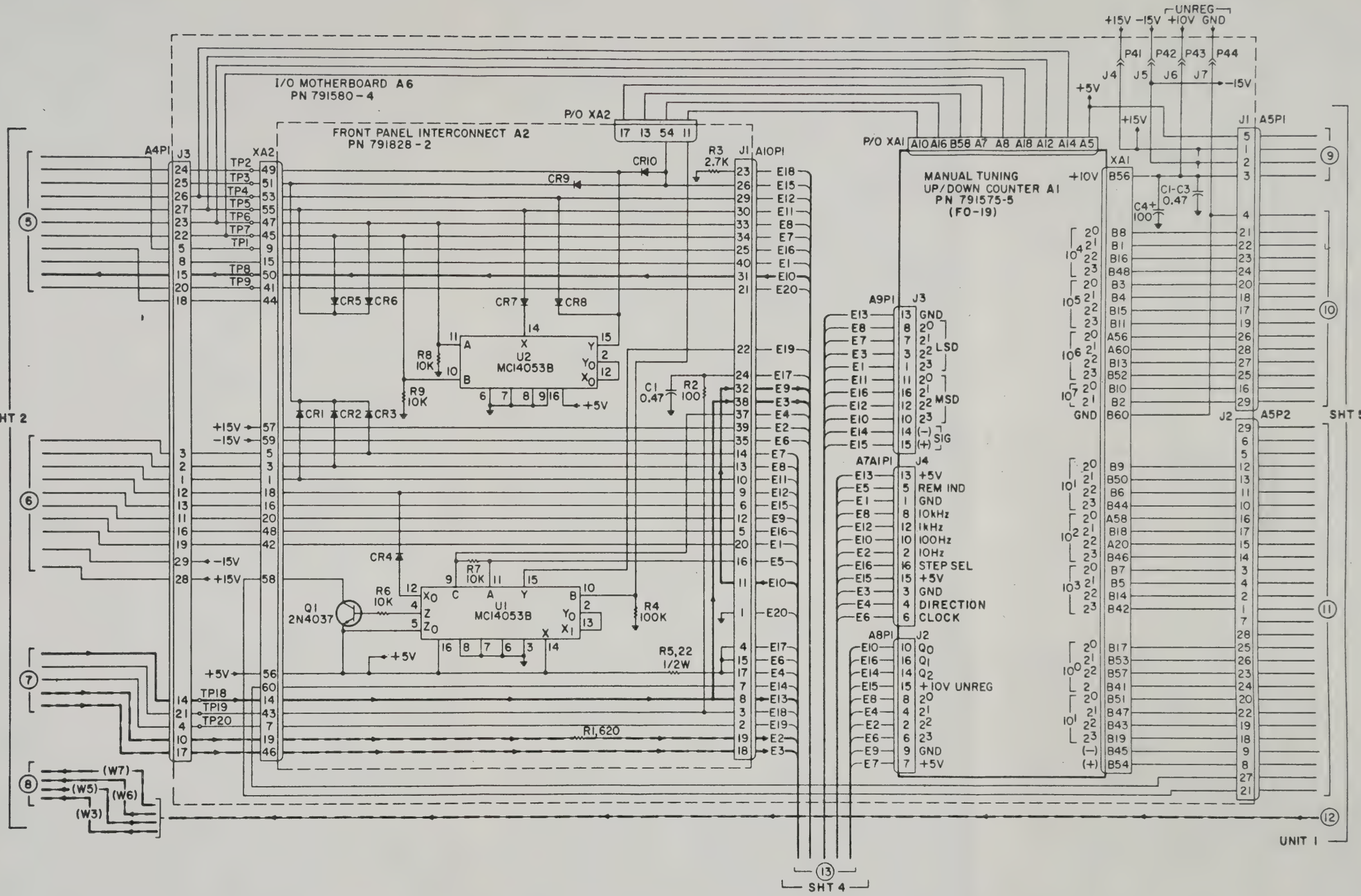


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 3 of 5)

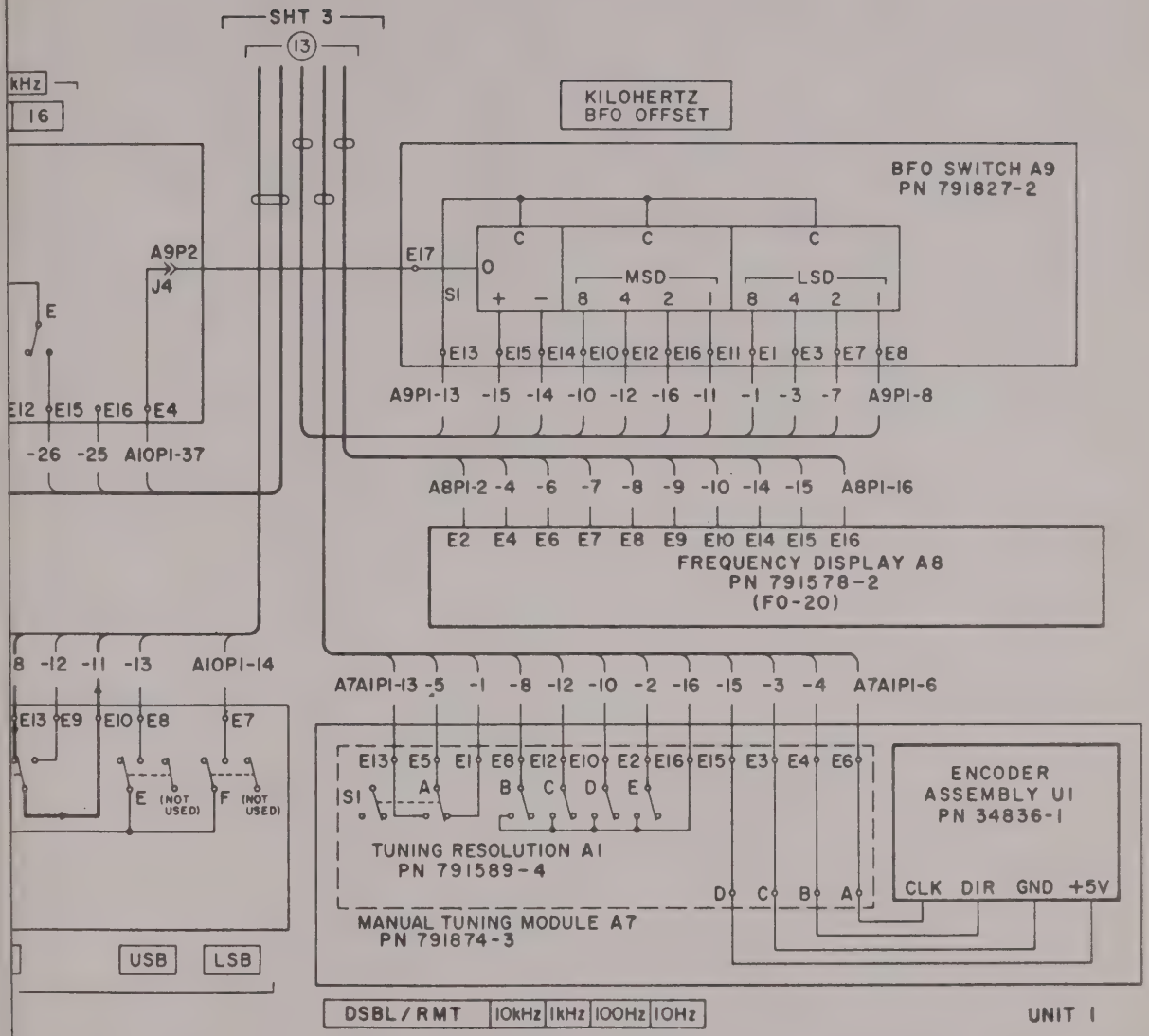


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 4 of 5)

SPECIFIC NOTE:

1. A10A1, A10A2 MODULES ARE PART OF FRONT PANEL CONTROL A10 PN 791684

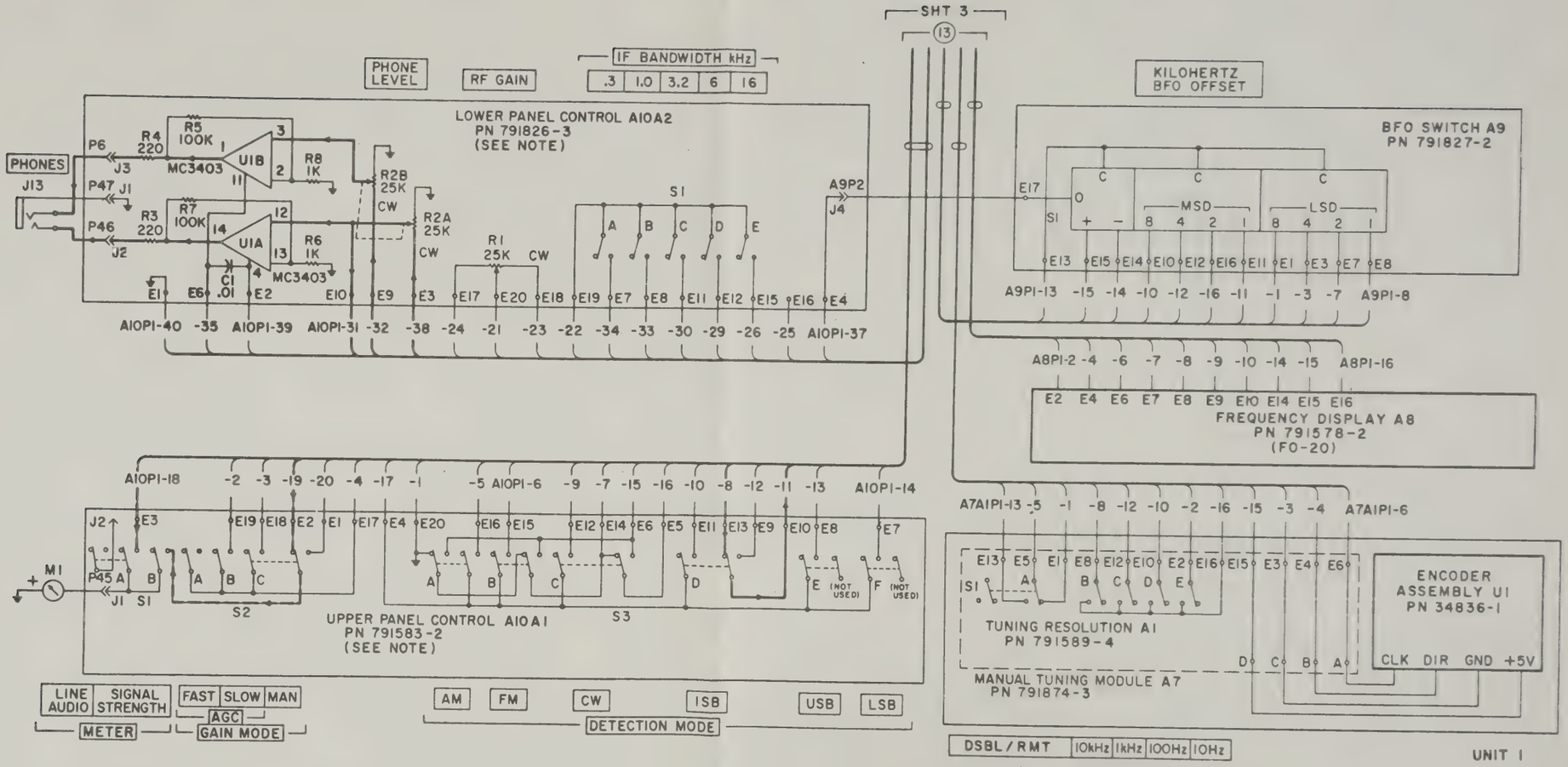


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 4 of 5)

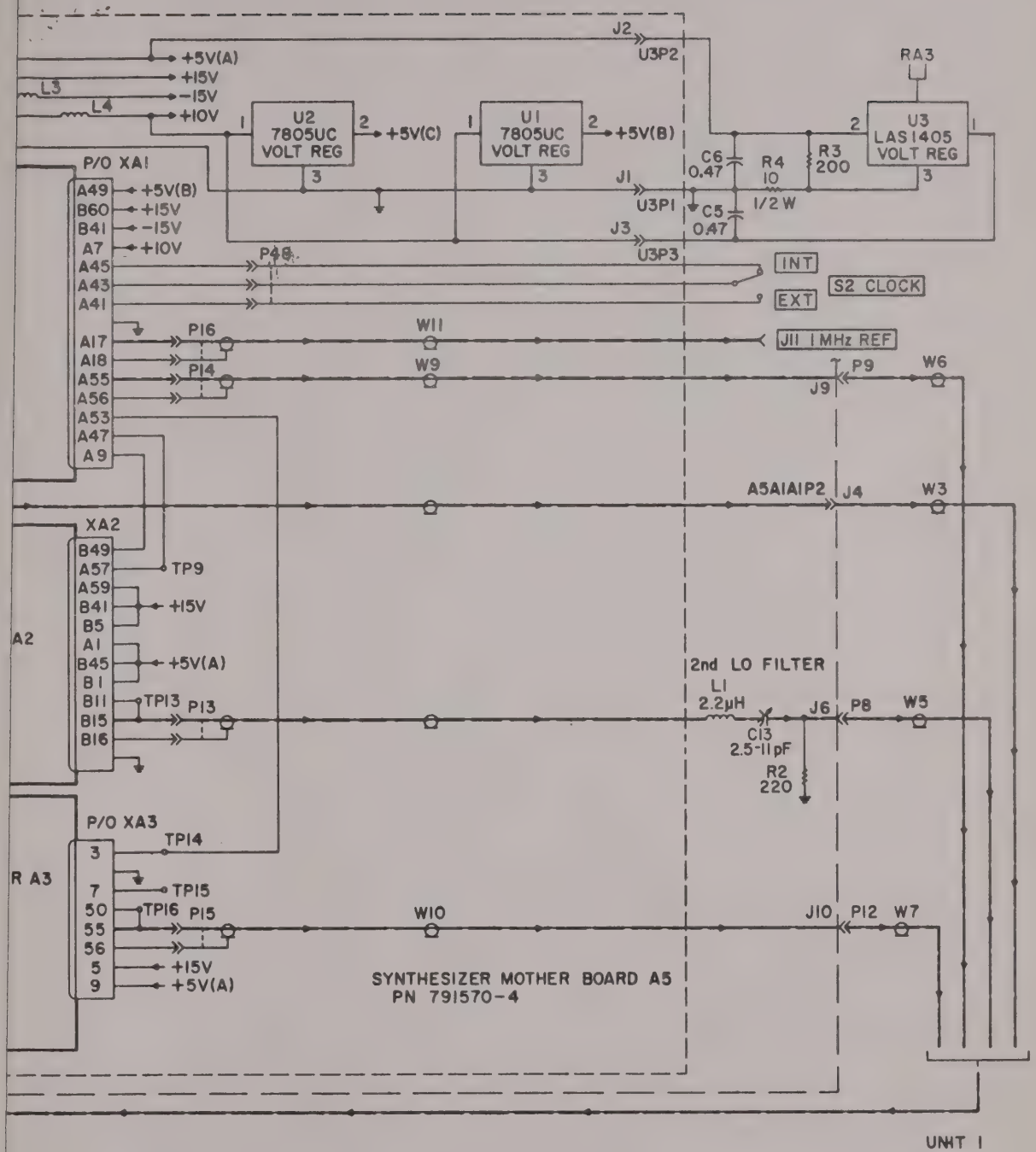


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 5 of 5)

SPECIFIC NOTES:

1. EACH CAPACITOR REFERENCE NUMBER IS IDENTICAL TO EACH "E" NUMBER. SPARE CAPACITORS & "E" NUMBERS ARE NOT SHOWN.
2. TEST POINT/PINS NOT SHOWN ARE: A5A1, MODULE PINS A13 (TP2) TIED TO A17, A60 (TP3) TIED TO A55, B9 (TP5), B1 (TP6), A5A2, MODULE PINS A51 (TP7), A55 (TP8), A49 (TP10), B57 (TP12).
3. TEST POINT DESCRIPTIONS:

A5 – TP1 NOT USED
TP2 1MHz REF
TP3 3RD LO
TP4 NOT USED
TP5 1ST LO UNLOCK
TP6 1ST LO TUNING VOLTS
TP7 2ND LO MAIN LOOP TUNING VOLTS
TP8 2ND LO 32.2MHz TUNING VOLTS
TP9 10kHz
TP10 2ND LO UNLOCK
TP11 NOT USED
TP12 2ND LO 32MHz TUNING VOLTS
TP13 2ND LO OUT
TP14 1kHz REF
TP15 BFO TUNING VOLTS
TP16 BFO OUT
TP17 FIXED BFO
TP18 BFO INHIBIT

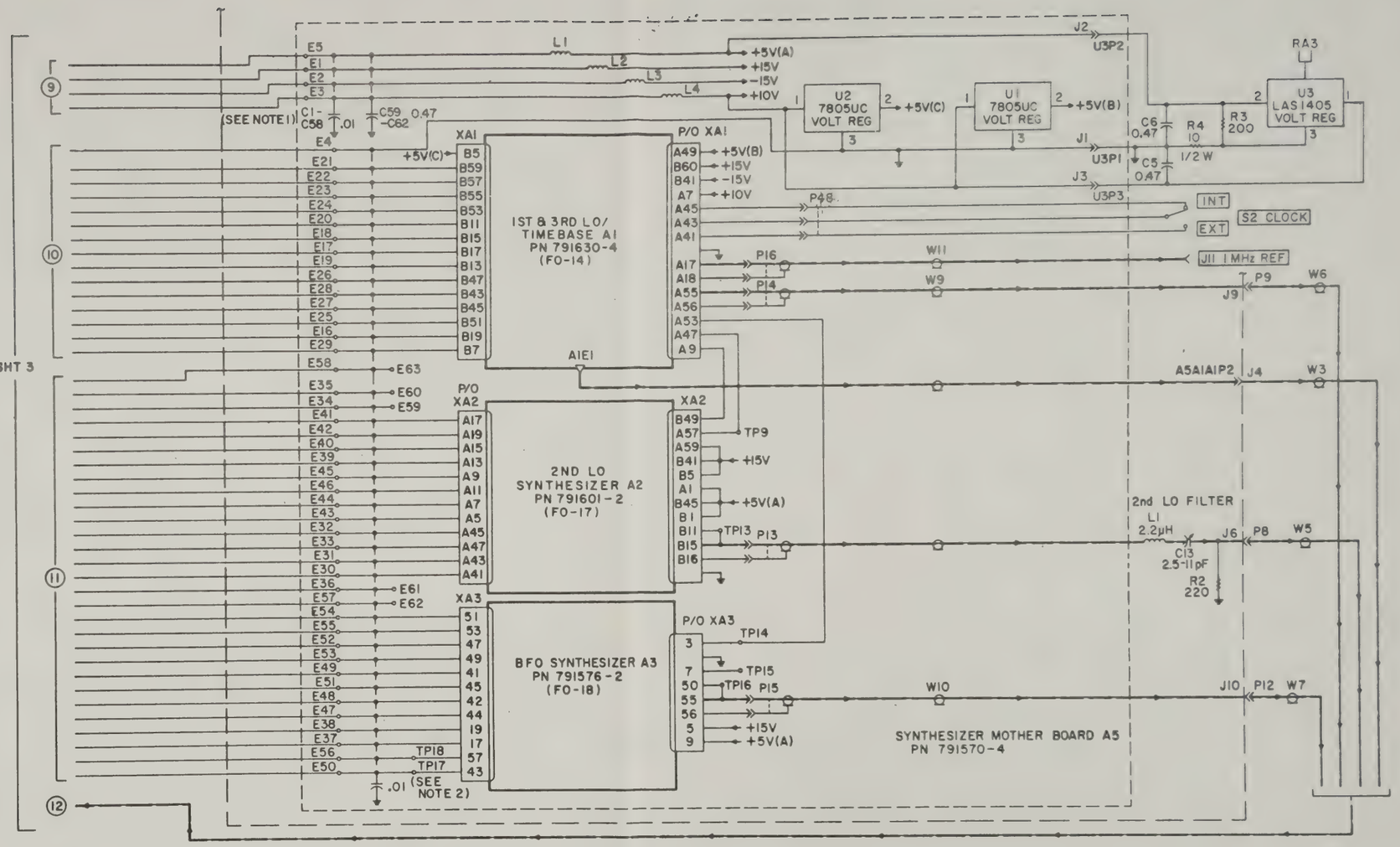


Figure FO-1. Receiving Set Radio AN/URR-74(V)2 Main Chassis (Unit 1), Schematic Diagram (Sheet 5 of 5)

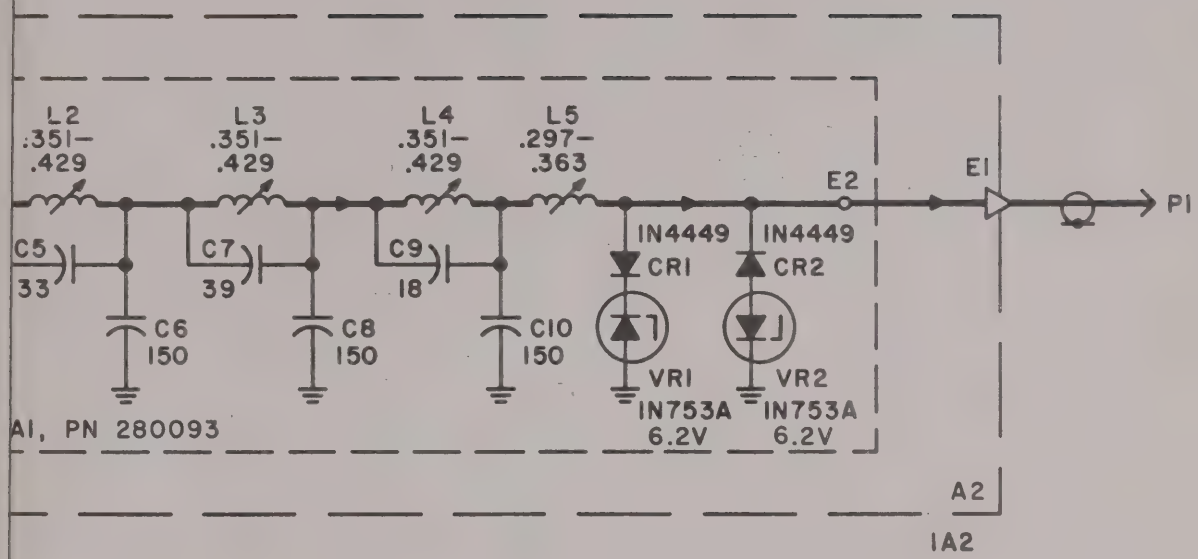


Figure FO-2. Pn 791616-2 Rf Filter (1A2), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN pF.
   3) INDUCTANCE IS IN µH.

B. ——→—— MAJOR SIGNAL PATH

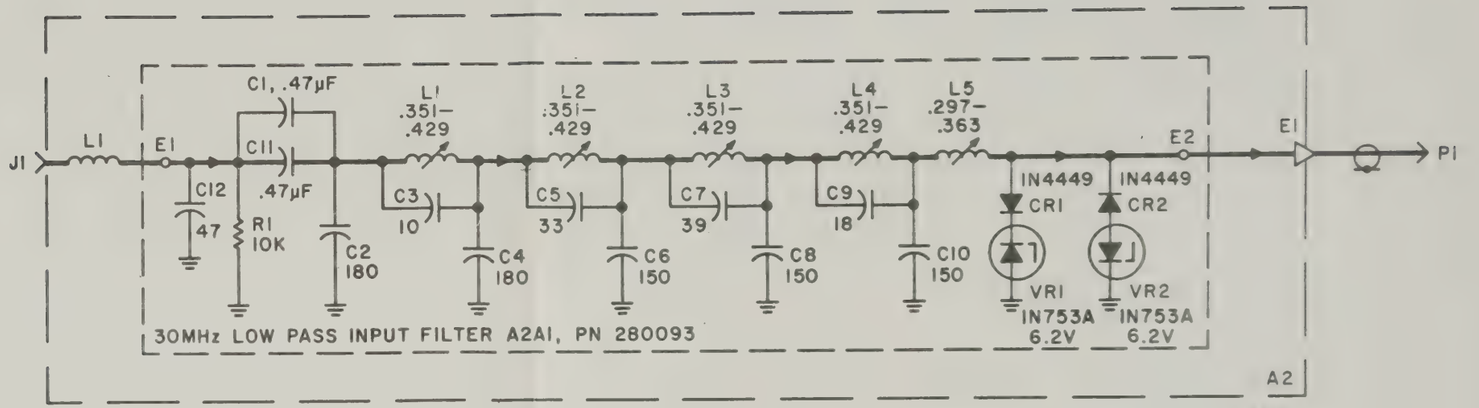


Figure FO-2. Pn 791616-2 Rf Filter (1A2), Schematic Diagram

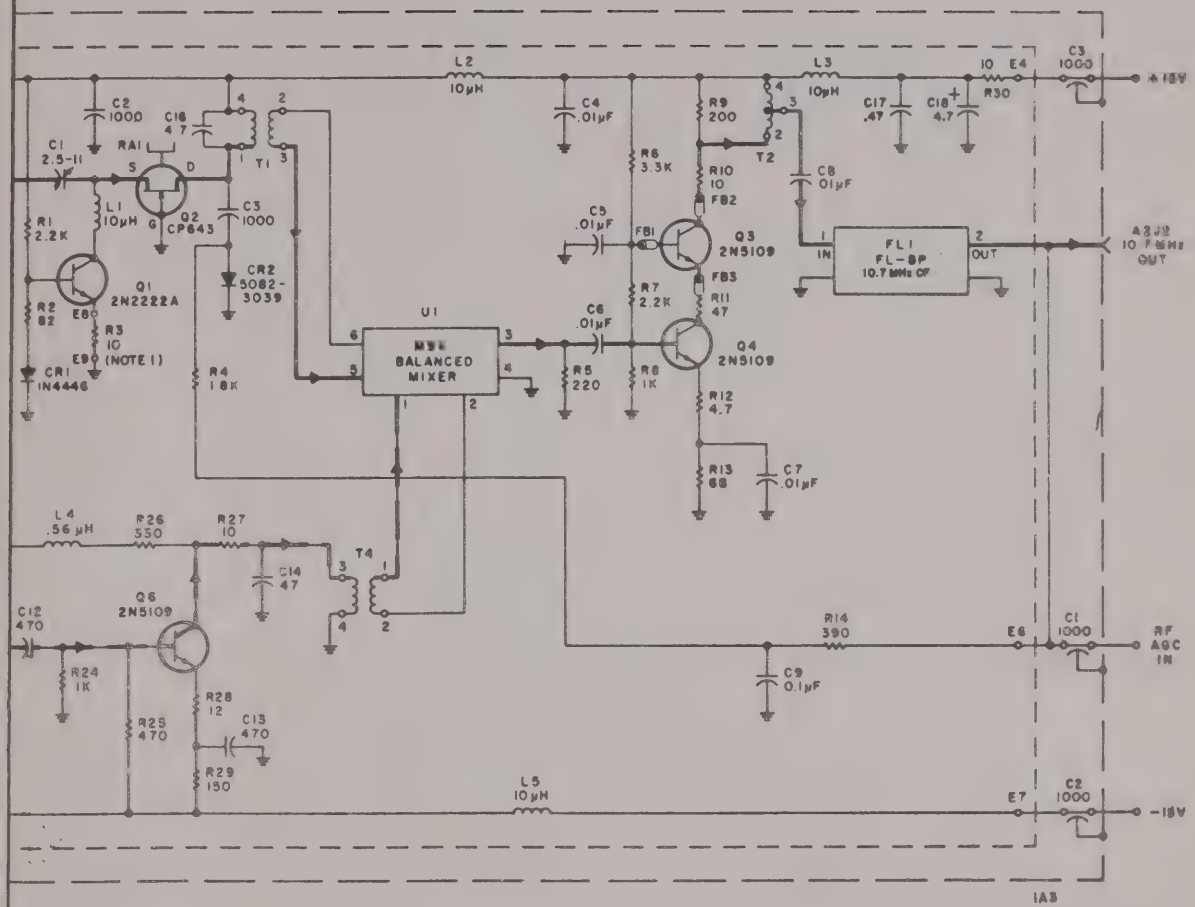


Figure FO-3. Pn 791592-1 Input Converter (1A3), Schematic Diagram

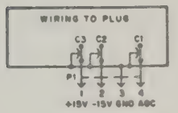
GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
2) CAPACITANCE IS IN pF.

B. ——●—— MAJOR SIGNAL PATH
——○—— MINOR SIGNAL PATH

SPECIFIC NOTES:

1. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7g)



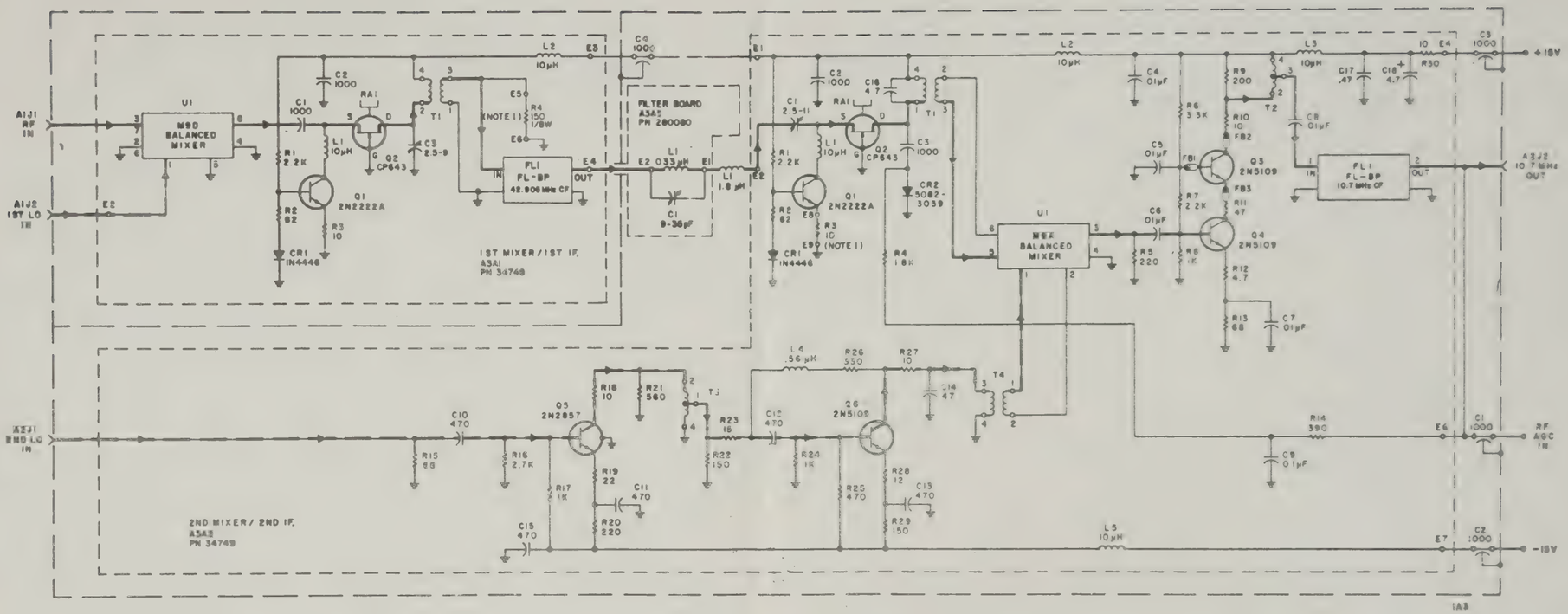


Figure FO-3. Pn 791592-1 Input Converter (1A3), Schematic Diagram

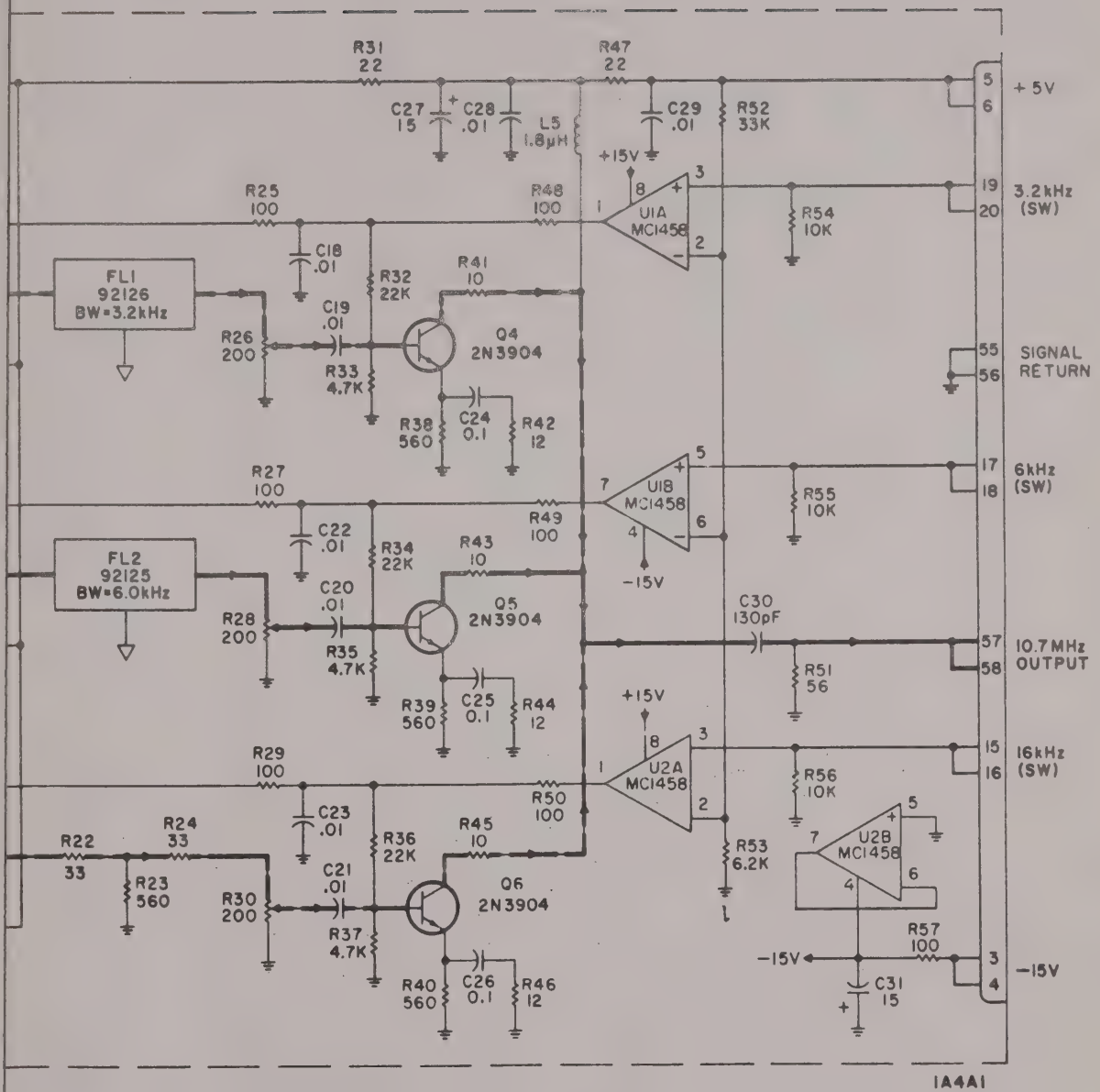
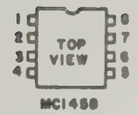


Figure FO-4. Pn 791594-4 Filter Switch, 10.7 MHz (1A4A1), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
1) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
2) CAPACITANCE IS IN μF.

B. ——●—— MAJOR SIGNAL PATH
——●—— MINOR SIGNAL PATH



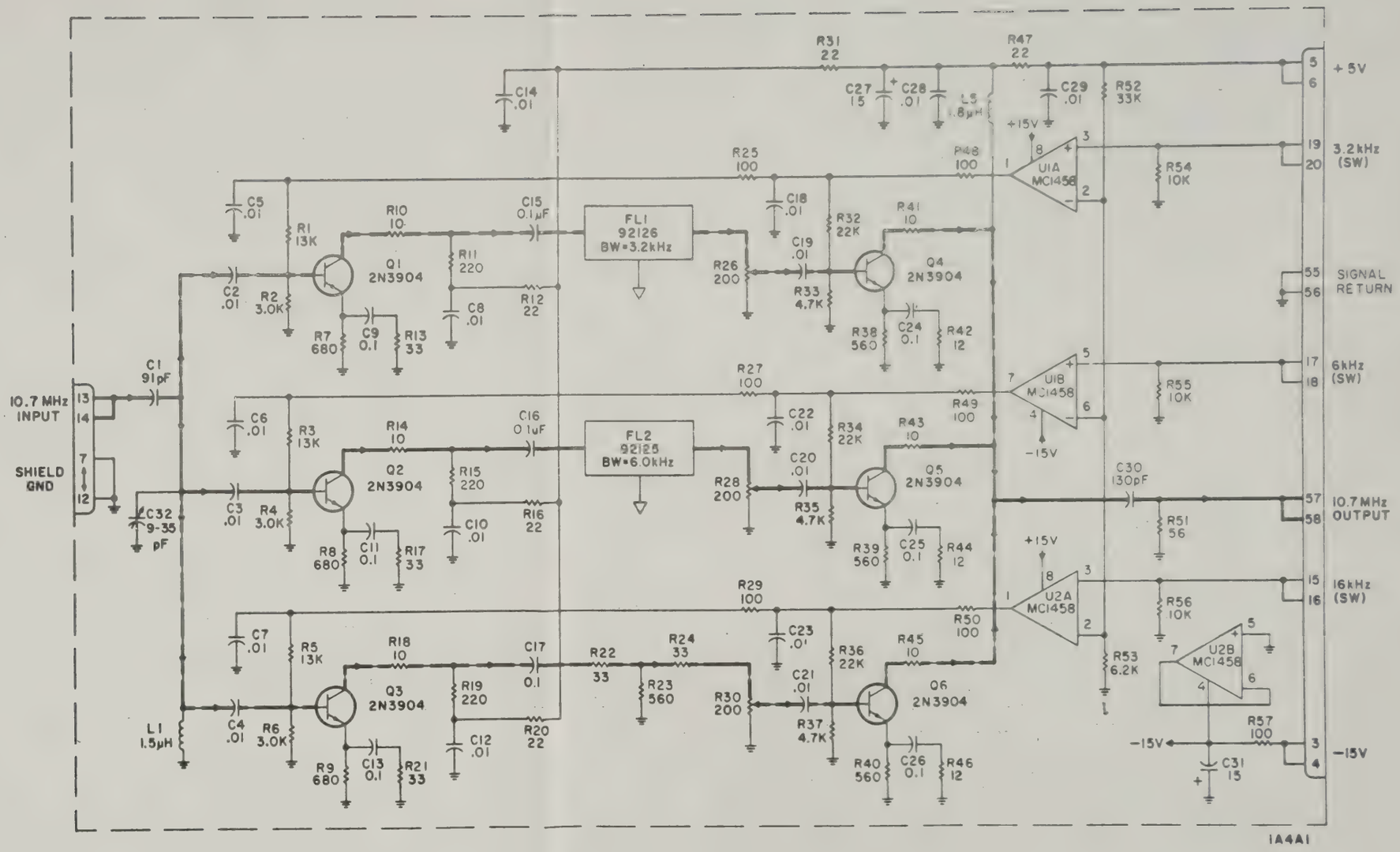


Figure FO-4. Pn 791594-4 Filter Switch, 10.7 MHz (1A4A1), Schematic Diagram

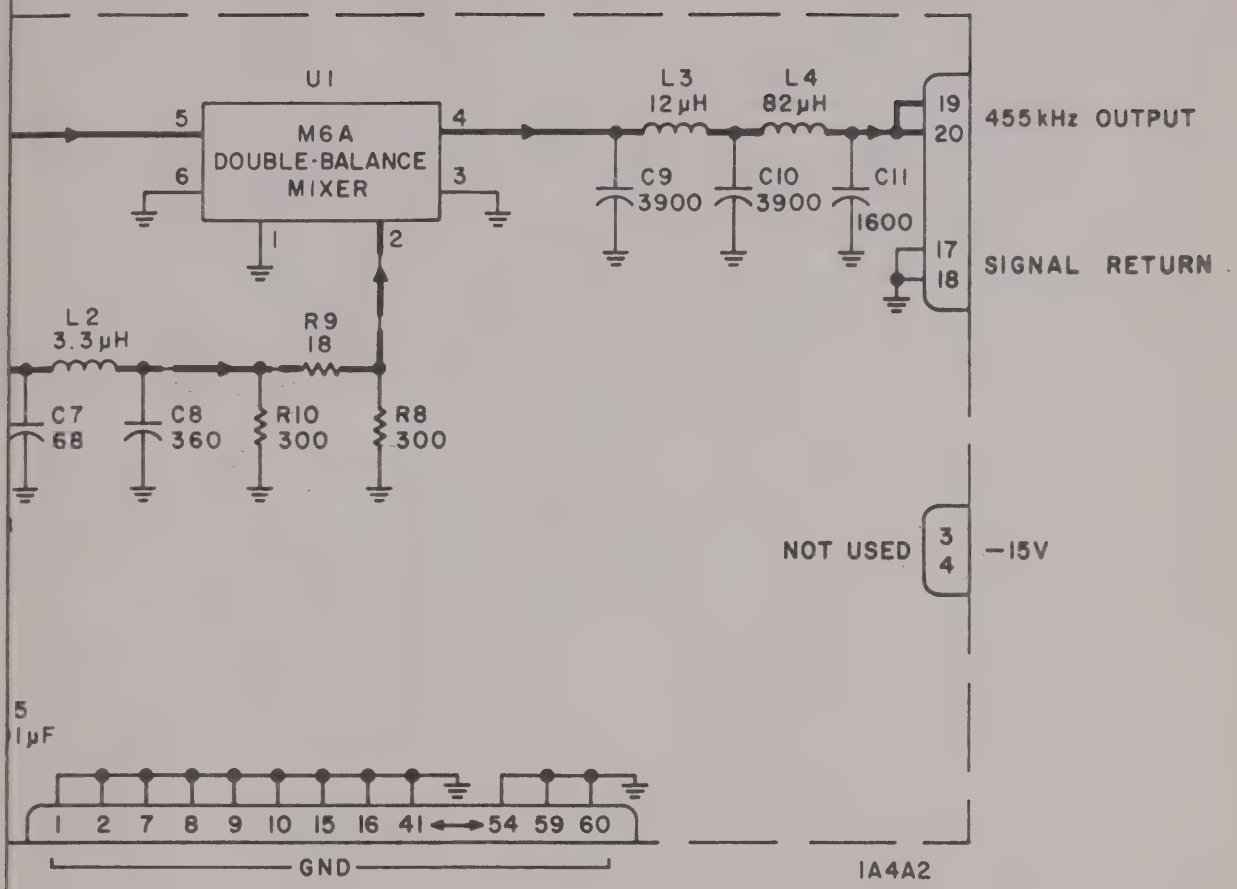


Figure FO-5. Pn 71430-2 Converter, 10.7 MHz/455 kHz (1A4A2), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN pF.

B. ——▶—— MAJOR SIGNAL PATH
   —▶—▶— MINOR SIGNAL PATH

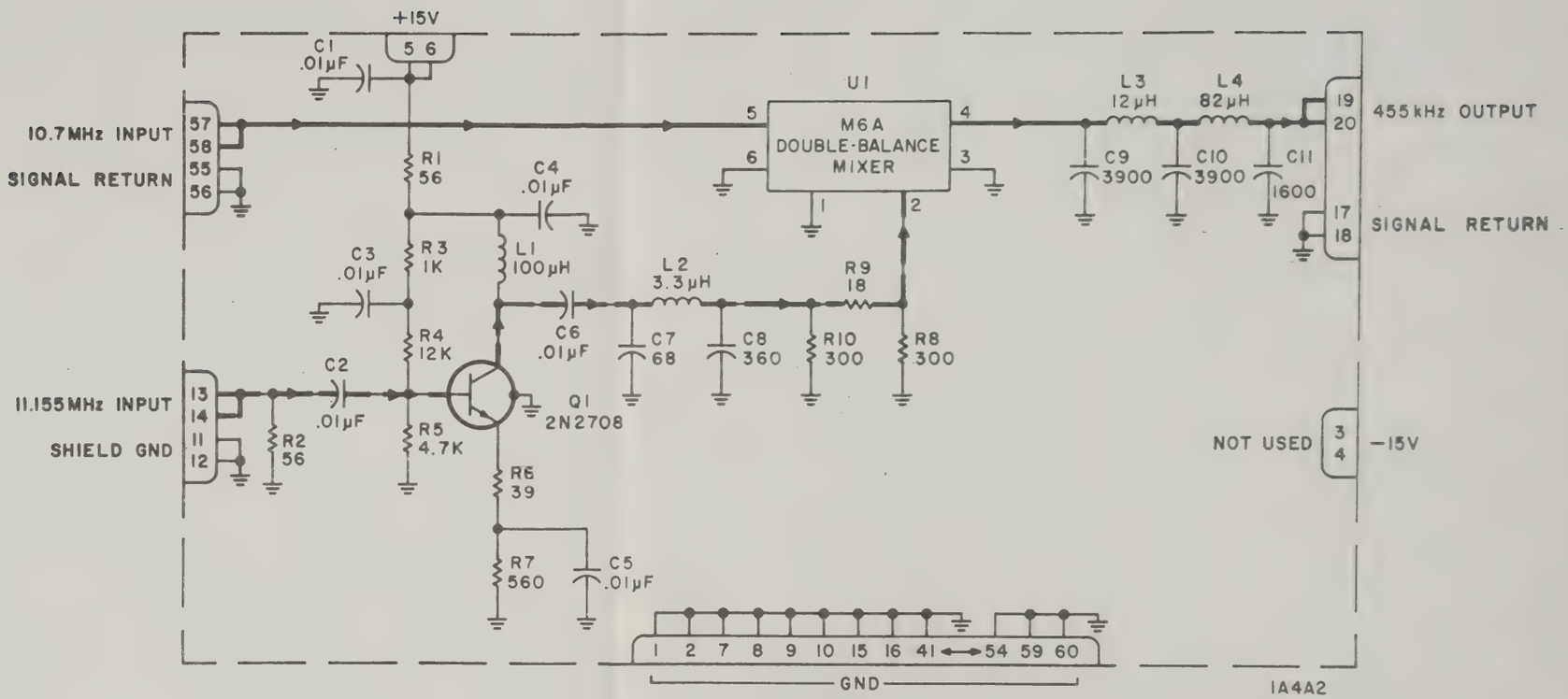


Figure FO-5. Pn 71430-2 Converter, 10.7 MHz/455 kHz (1A4A2), Schematic Diagram

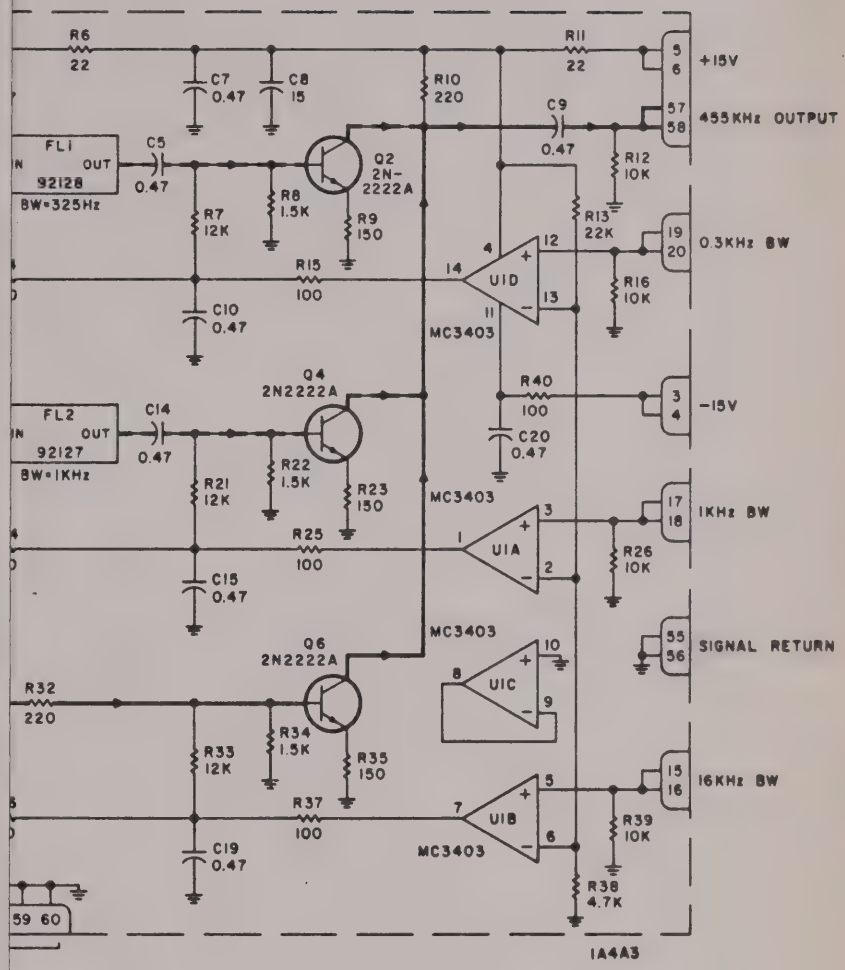


Figure FO-6. Pn 791595-6 Filter Switch, 455 kHz (1A4A3), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, +5%, 1/4W.
   2) CAPACITANCE IS IN μF.
   3) INDUCTANCE IS IN mH.

B. ——●—— MAJOR SIGNAL PATH
   —●—●— MINOR SIGNAL PATH

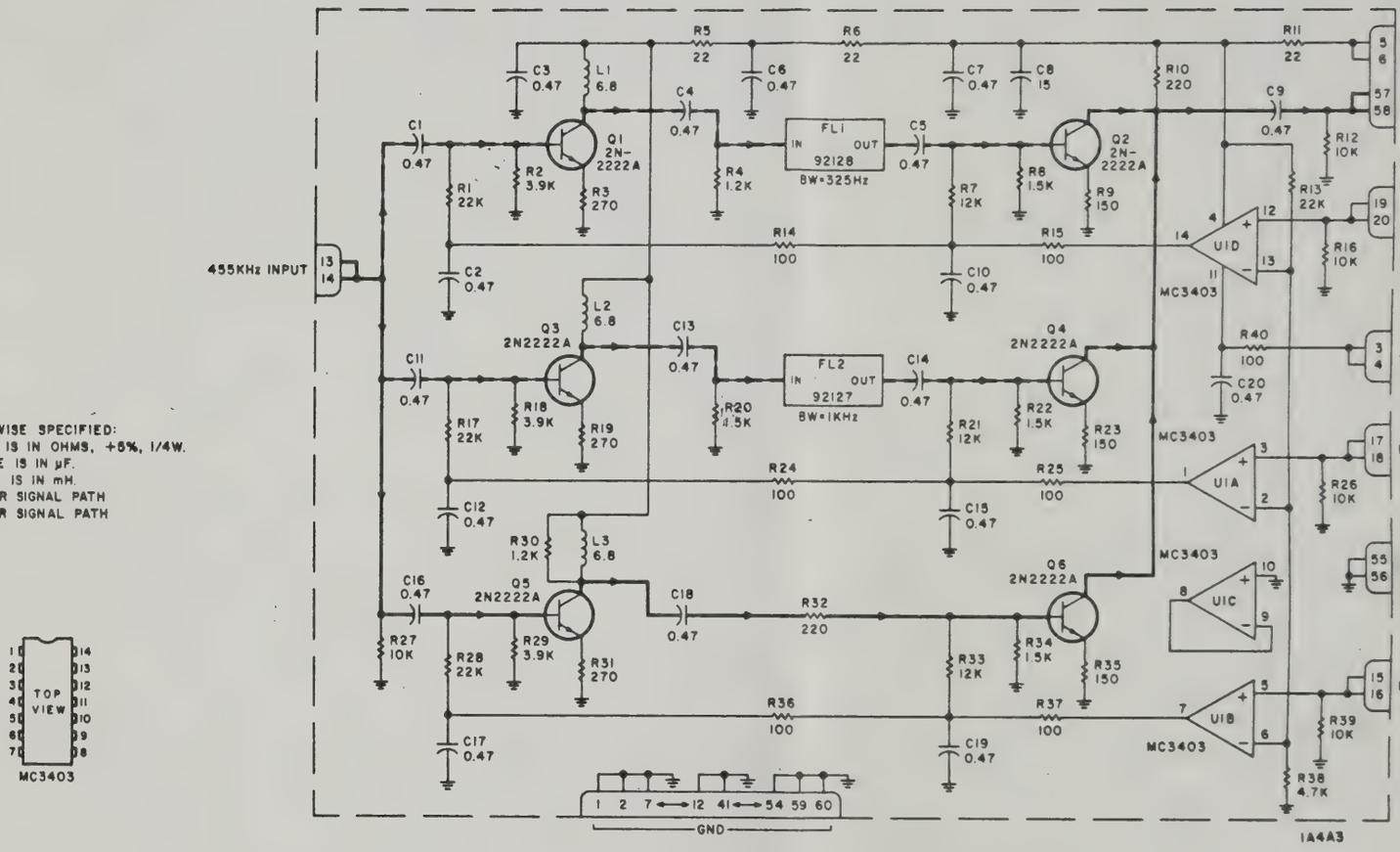


Figure FO-6. Pn 791595-6 Filter Switch, 455 kHz (1A4A3), Schematic Diagram

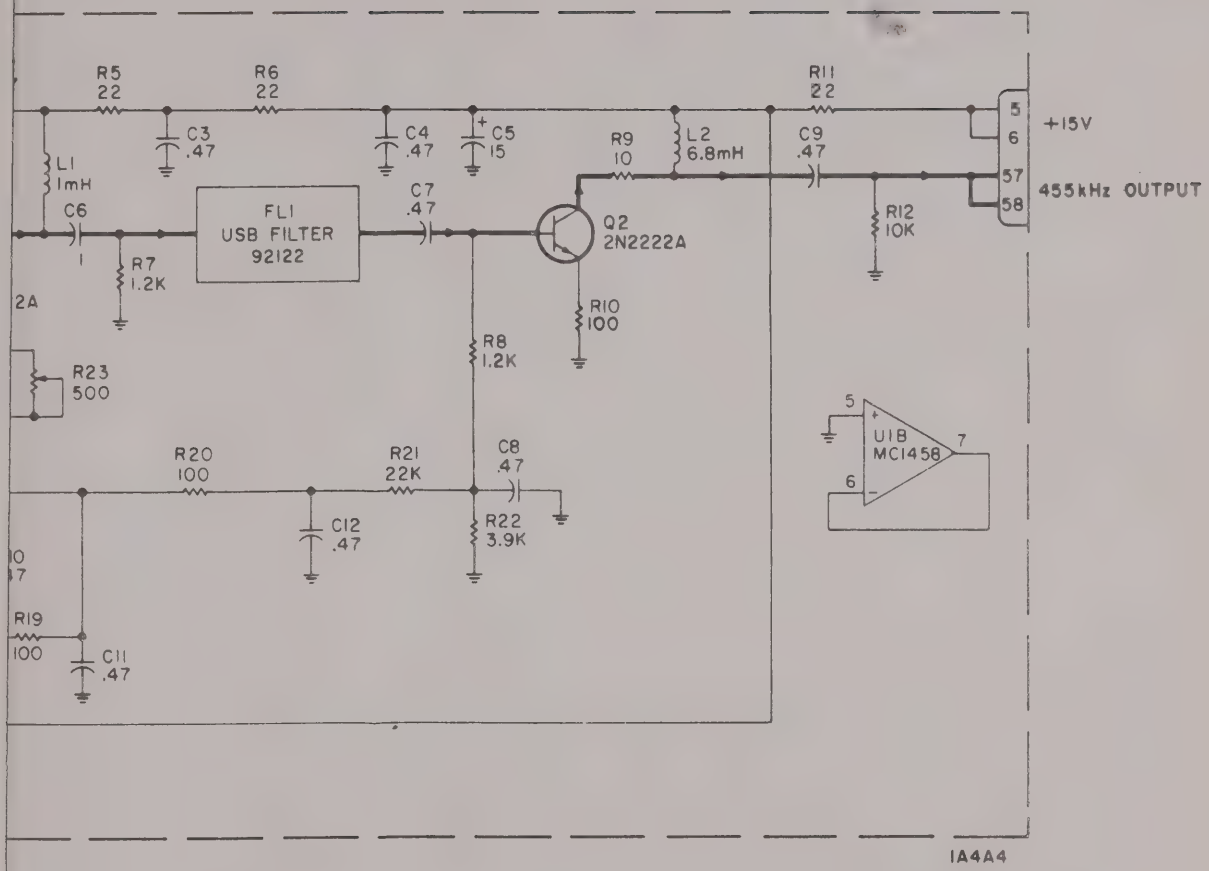
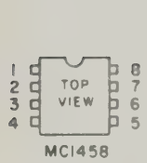


Figure FO-7. Pn 791596-3 Usb Filter Switch (1A4A4), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
   2) CAPACITANCE IS IN μF.

B. —●— MAJOR SIGNAL PATH



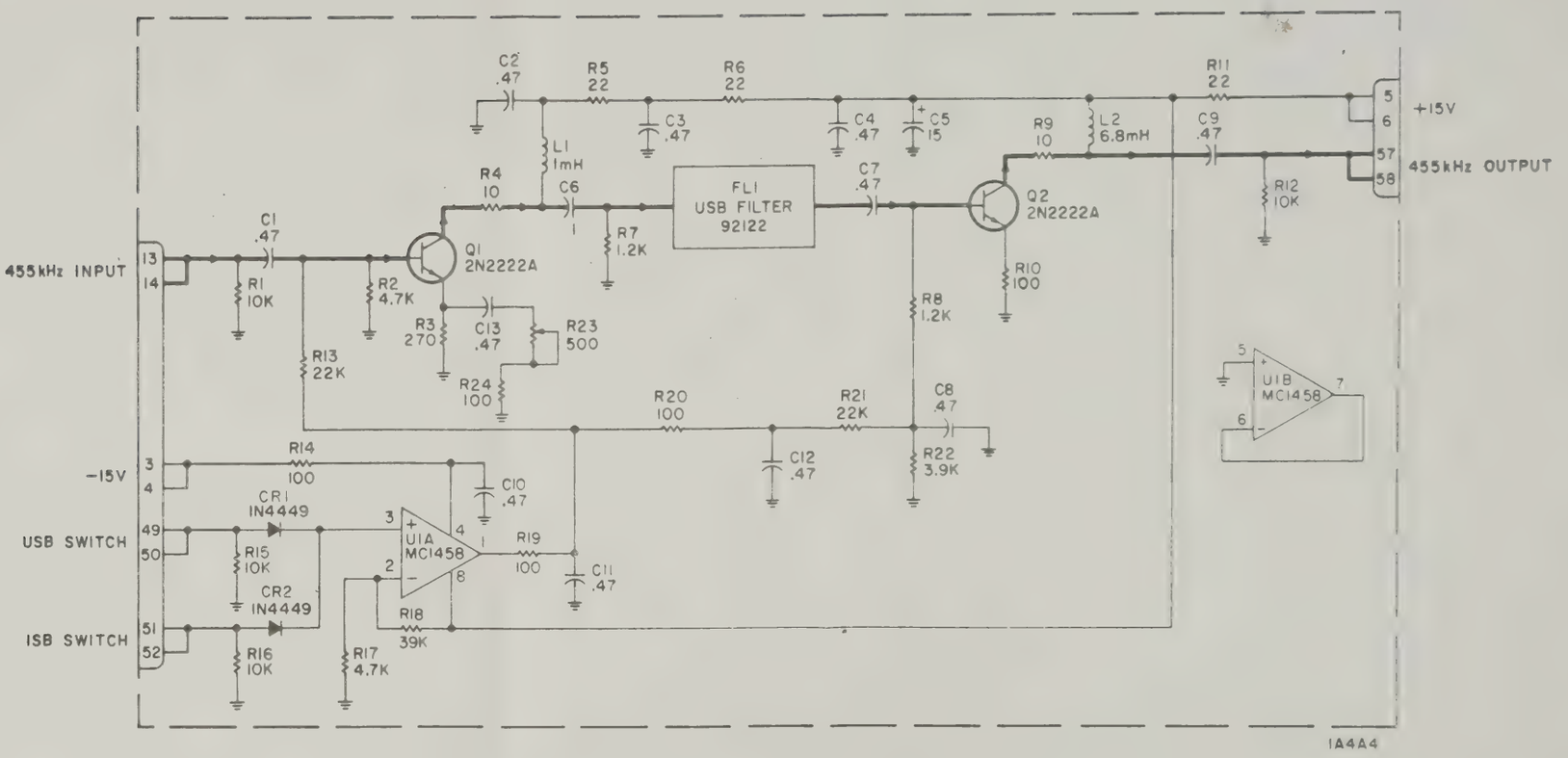


Figure FO-7. Pn 791596-3 Usb Filter Switch (1A4A4), Schematic Diagram

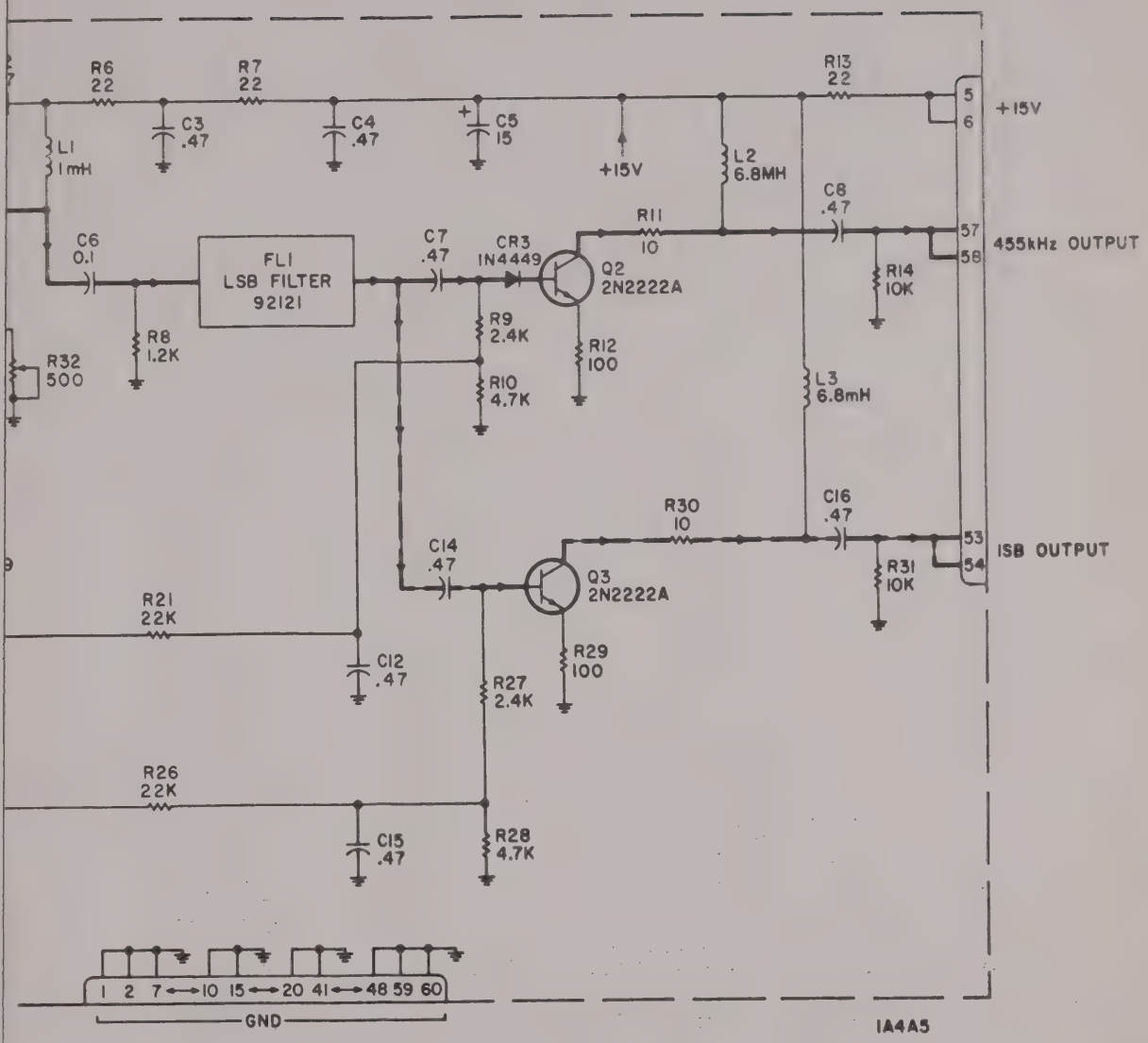


Figure FO-8. Pn 791597-3 Isb/Lsb Filter Switch (1A4A5), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN µF.

B. ——●—— MAJOR SIGNAL PATH

——●—— MINOR SIGNAL PATH

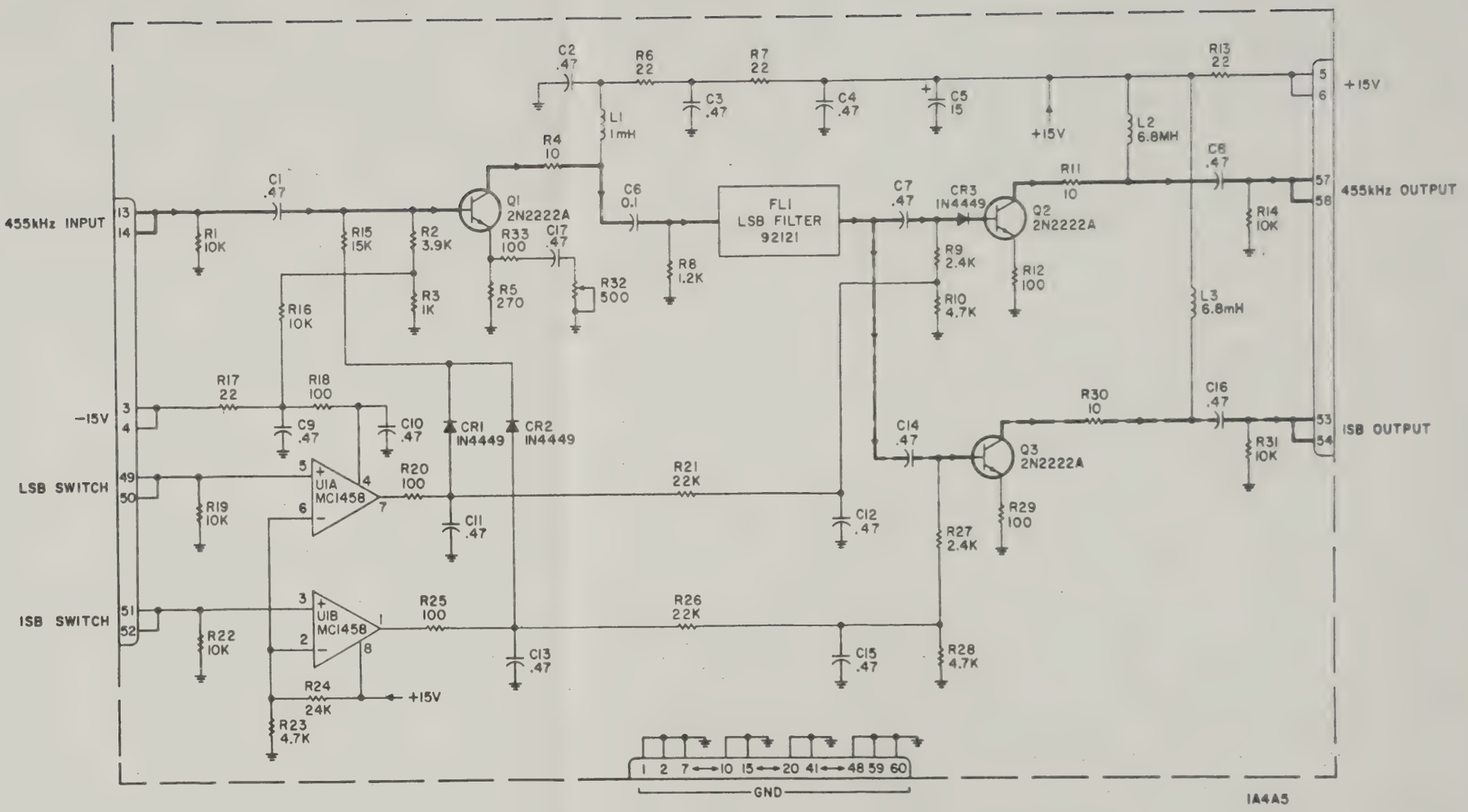


Figure FO-8. Pn 791597-3 Isb/Lsb Filter Switch (1A4A5), Schematic Diagram

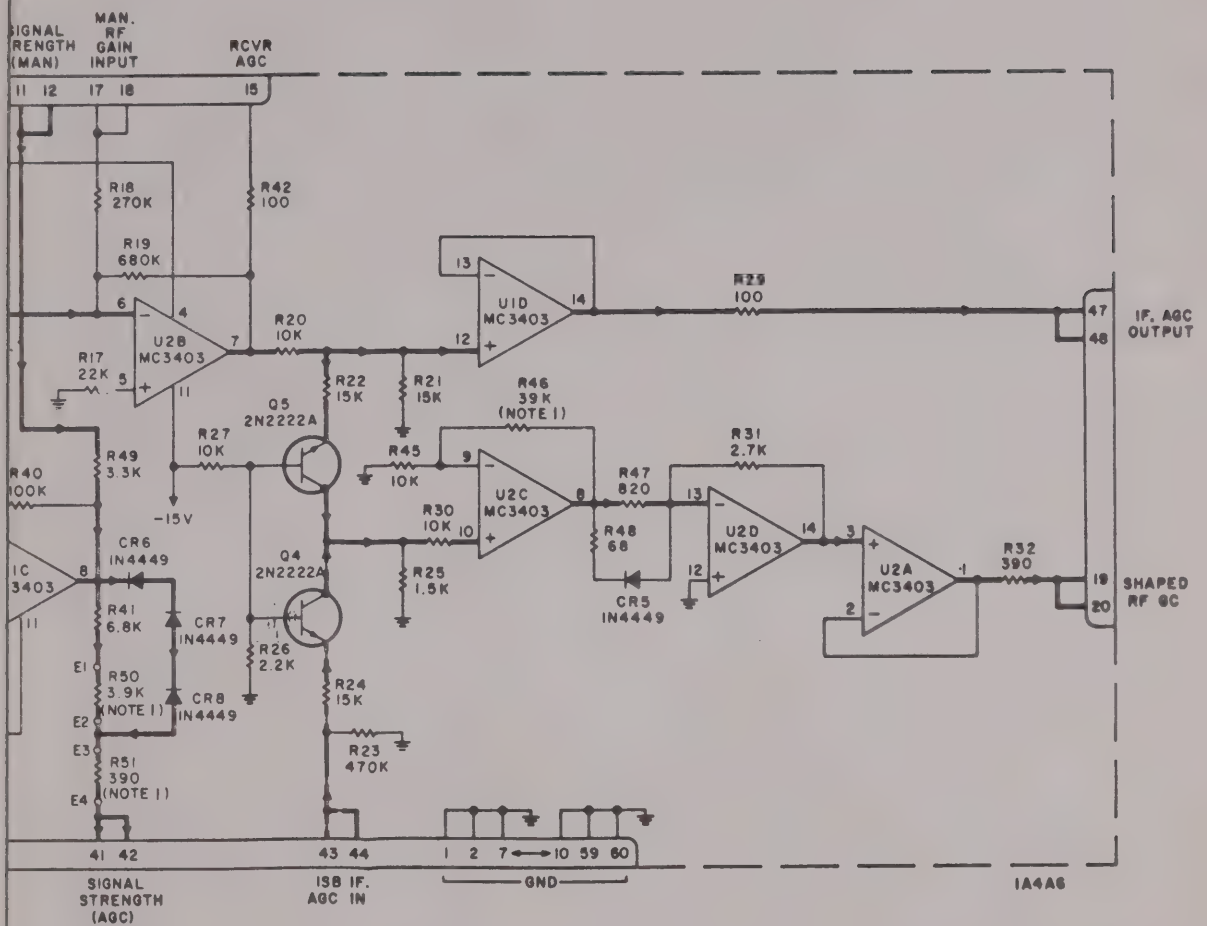


Figure FO-9. Pn 78112-4 Agc Amplifier (1A4A6), Schematic Diagram

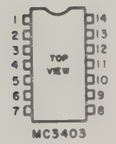
GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN μF.

B. ——●—— MAJOR SIGNAL PATH
   —●—●— MINOR SIGNAL PATH

SPECIFIC NOTES:

1. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7φ)



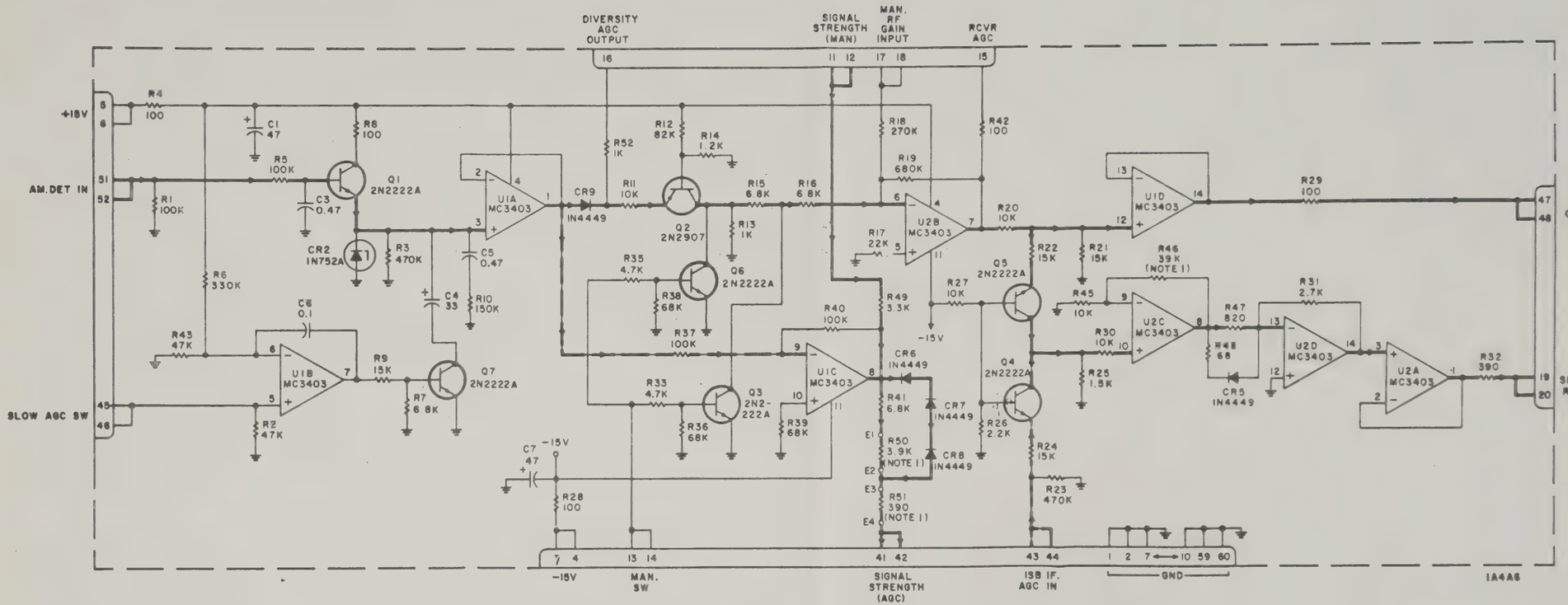


Figure FO-9. Pn 78112-4 Agc Amplifier (1A4A6), Schematic Diagram

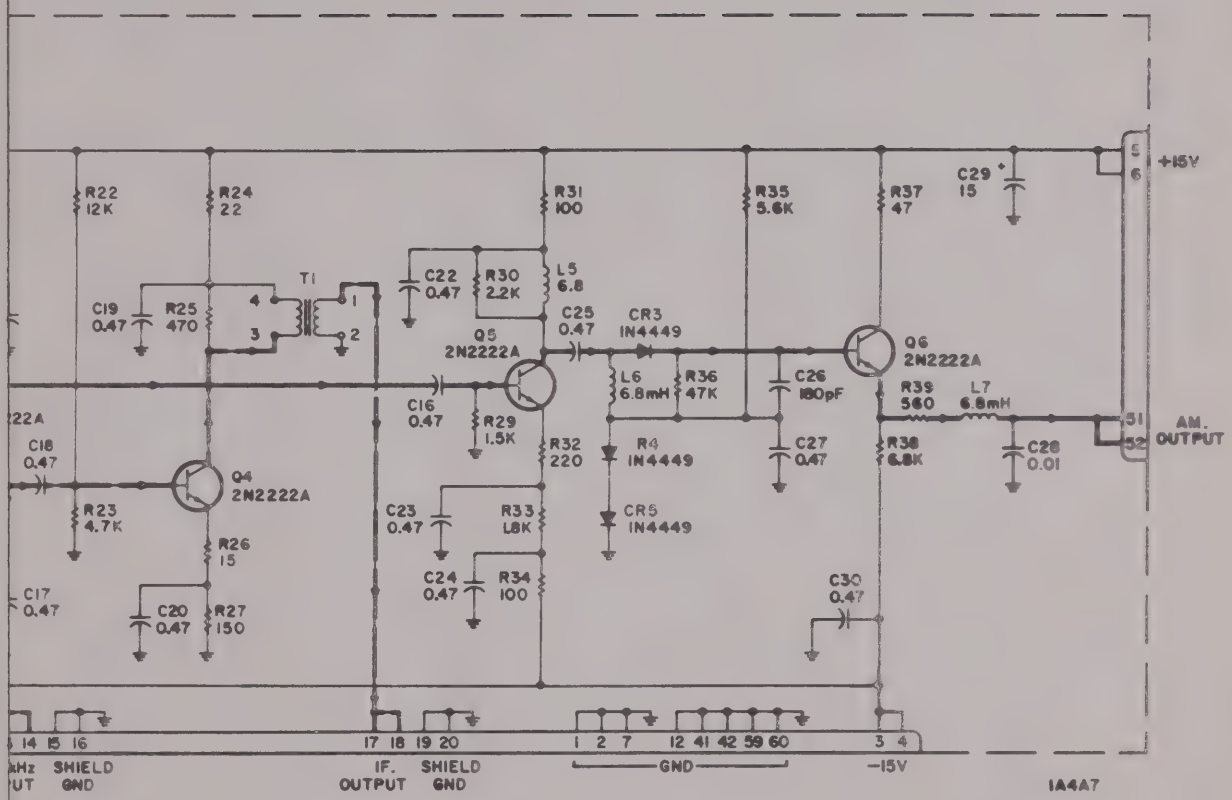


Figure FO-10. Pn 72488-3 Amplifier/Am. Detector, 455 kHz (1A4A7), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS µF.

B. ——— MAJOR SIGNAL PATH
   — — — MINOR SIGNAL PATH

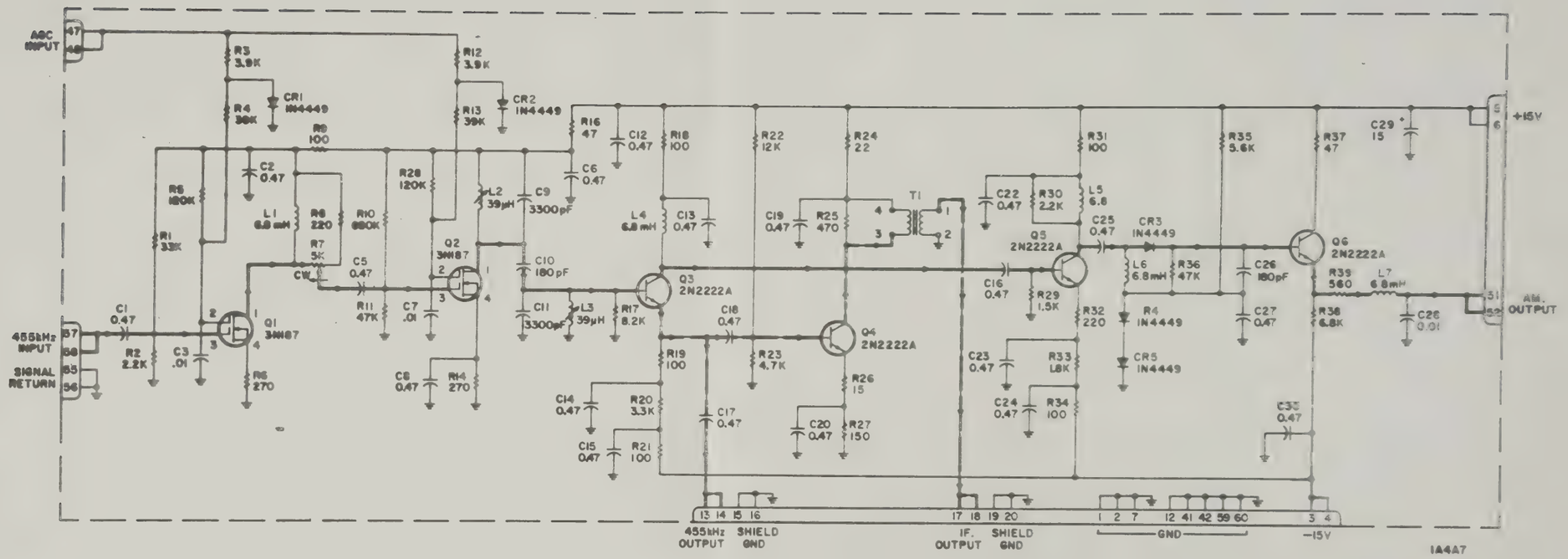


Figure FO-10. Pn 72488-3 Amplifier/Am. Detector, 455 kHz (1A4A7), Schematic Diagram

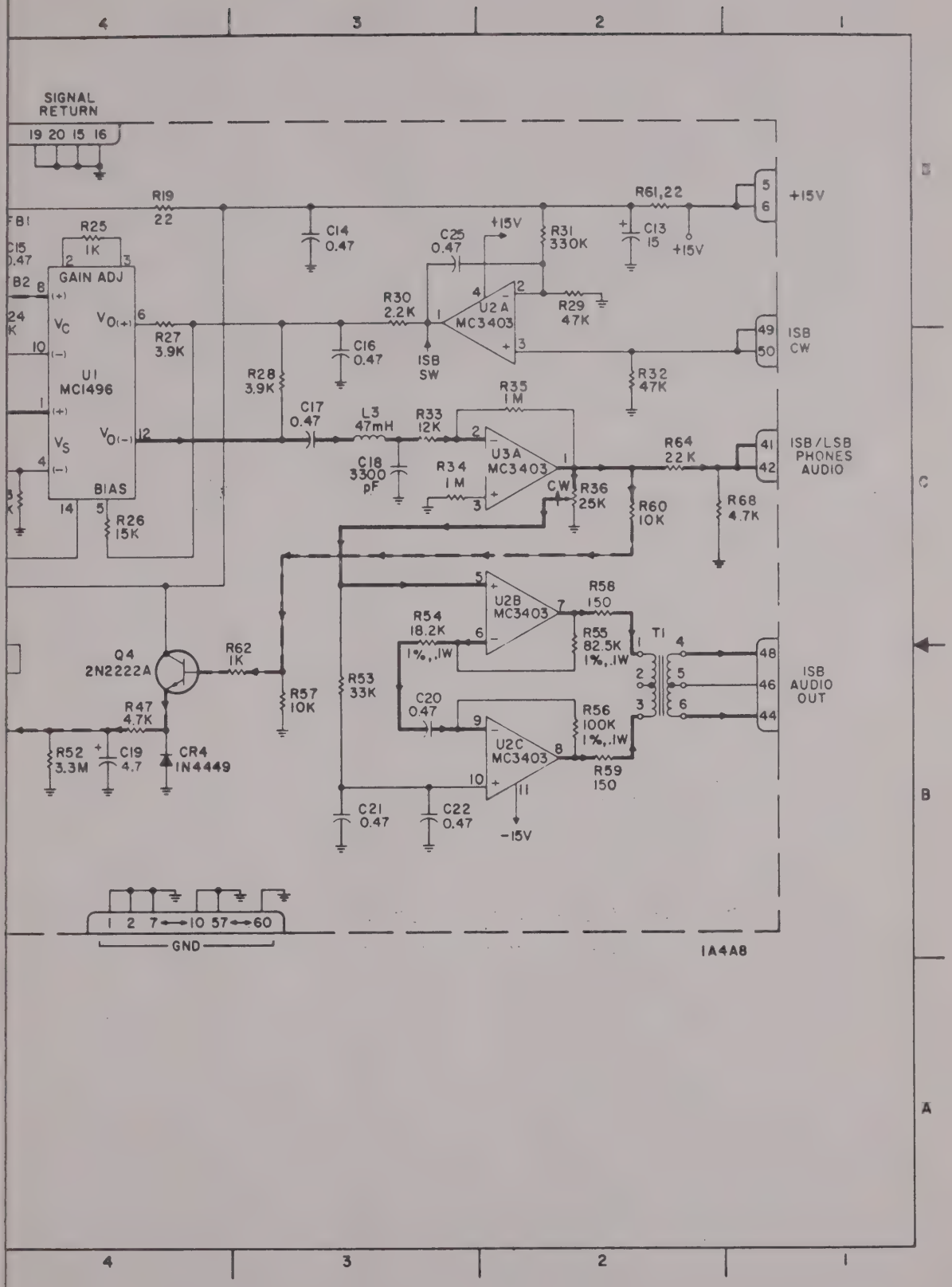


Figure FO-11. Pn 791598-2 Isb Detector/Audio (1A4A8), Schematic Diagram

PARTS LOCATION INDEX

REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE
C1	8D	L2	5D	R20	5C	R48	5C
C2	7C	L3	3C	R21	5C	R49	6B
C3	7D	Q1	7D	R22	5C	R50	5C
C5	6D	Q2	5D	R23	4C	R51	5B
C6	7C	Q3	5B	R24	4D	R52	4B
C7	6C	Q4	4B	R25	4D	R53	3B
C8	5C	Q5	7B	R26	4C	R54	3C
C9	6D	R1	7C	R27	4D	R55	2C
C10	5C	R2	7D	R28	3C	R56	2B
C11	5C	R3	7D	R29	2D	R57	3B
C12	7C	R4	7C	R30	3D	R58	2C
C13	2D	R5	7C	R31	2D	R59	2B
C14	3D	R6	7D	R32	2C	R60	2C
C15	4D	R7	7C	R33	3C	R61	2D
C16	3C	R8	6D	R34	3C	R62	3B
C17	3C	R9	6D	R35	2C	R63	8C
C18	3C	R10	6D	R36	2C	R64	2C
C19	4B	R11	8C	R37	8C	R65	7C
C20	3B	R12	8D	R39	5B	R66	7B
C21	3B	R13	6D	R41	6B	R67	7B
C22	3B	R14	6C	R42	6B	R68	1C
C25	3D	R15	6C	R43	6B	T1	2B
CR1	7C	R16	5D	R44	6B	U1	4C
CR2	6C	R17	5C	R45	6B	U2	2C,2B,5B
CR4	4B	R18	5D	R46	6B	U3	2C,5B,7B
L1	6D	R19	4D	R47	4B		

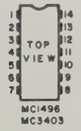
GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
1) RESISTANCE IS IN OHMS, ±5%, 1/4W
2) CAPACITANCE IS IN μF

B. —— MAJOR SIGNAL PATH
—·— MINOR SIGNAL PATH

SPECIFIC NOTES:

1. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7g)



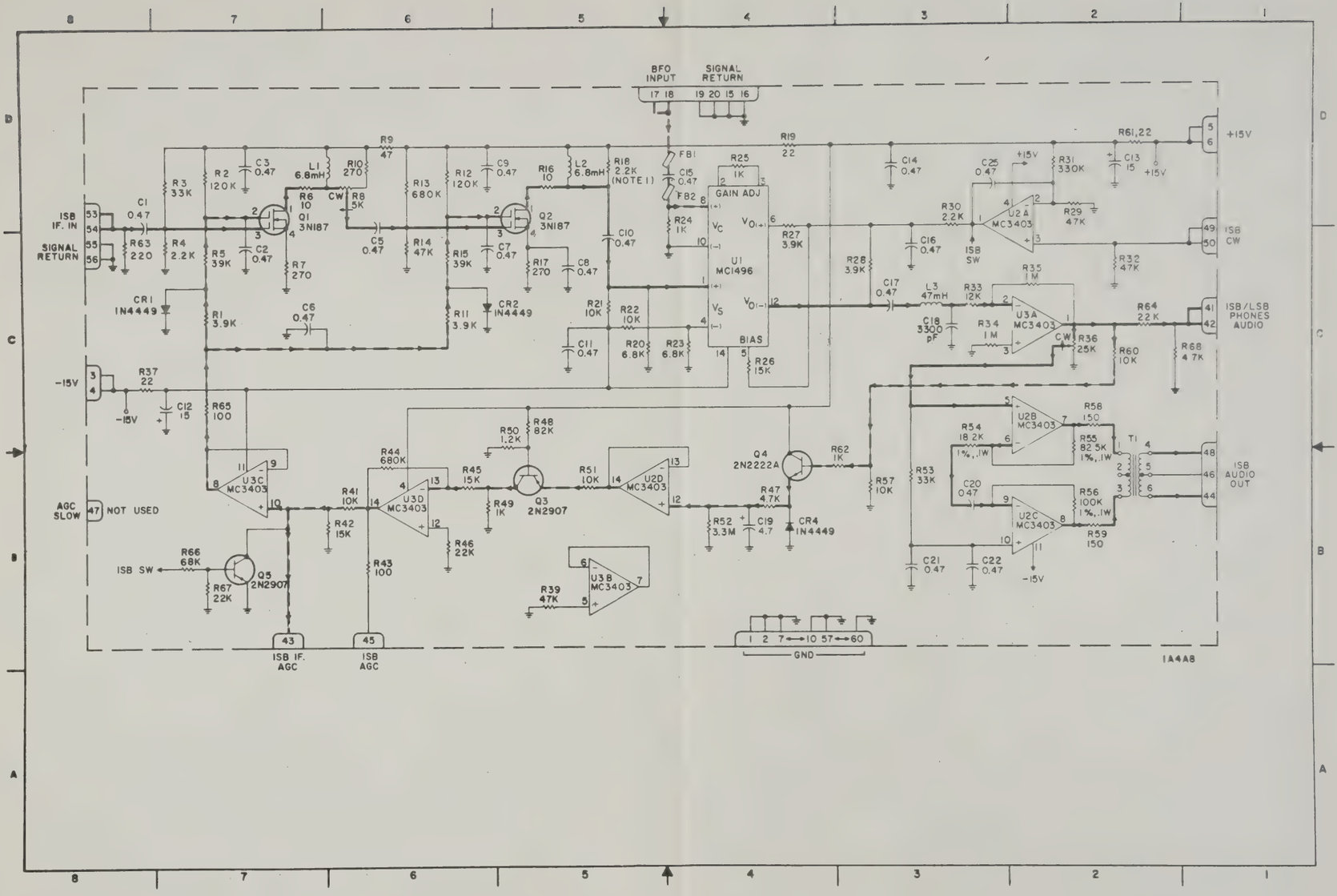


Figure FO-11. Pn 791598-2 Isb Detector/Audio (1A4A8), Schematic Diagram

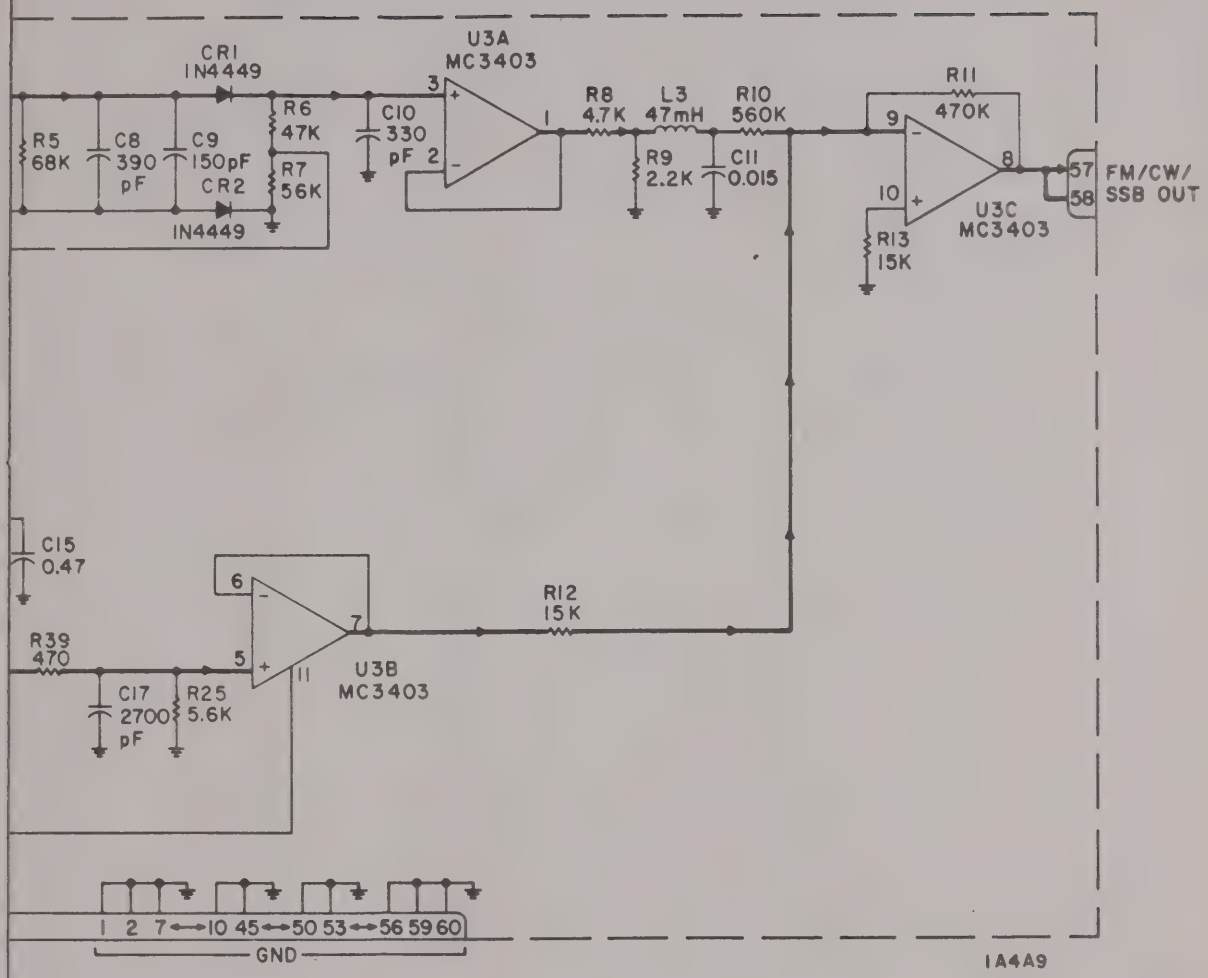


Figure FO-12. Pn 791599-3 Fm, Cw and Ssb Detector (1A4A9), Schematic Diagram

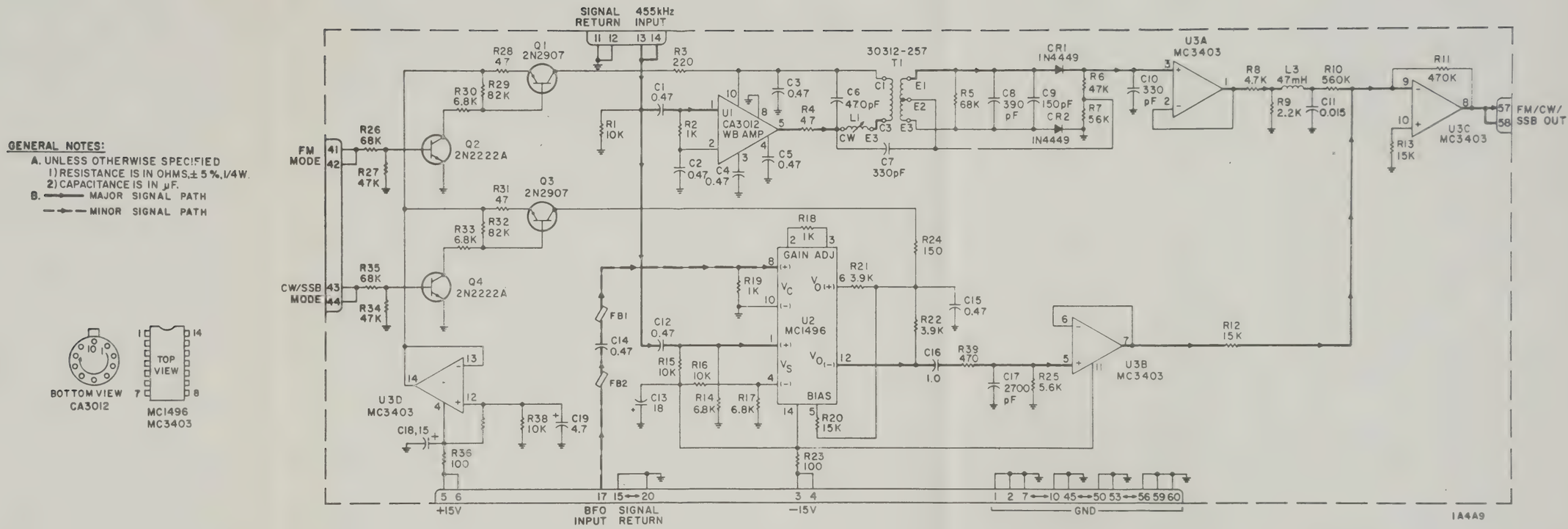


Figure FO-12. Pn 791599-3 Fm, Cw and Ssb Detector (1A4A9), Schematic Diagram

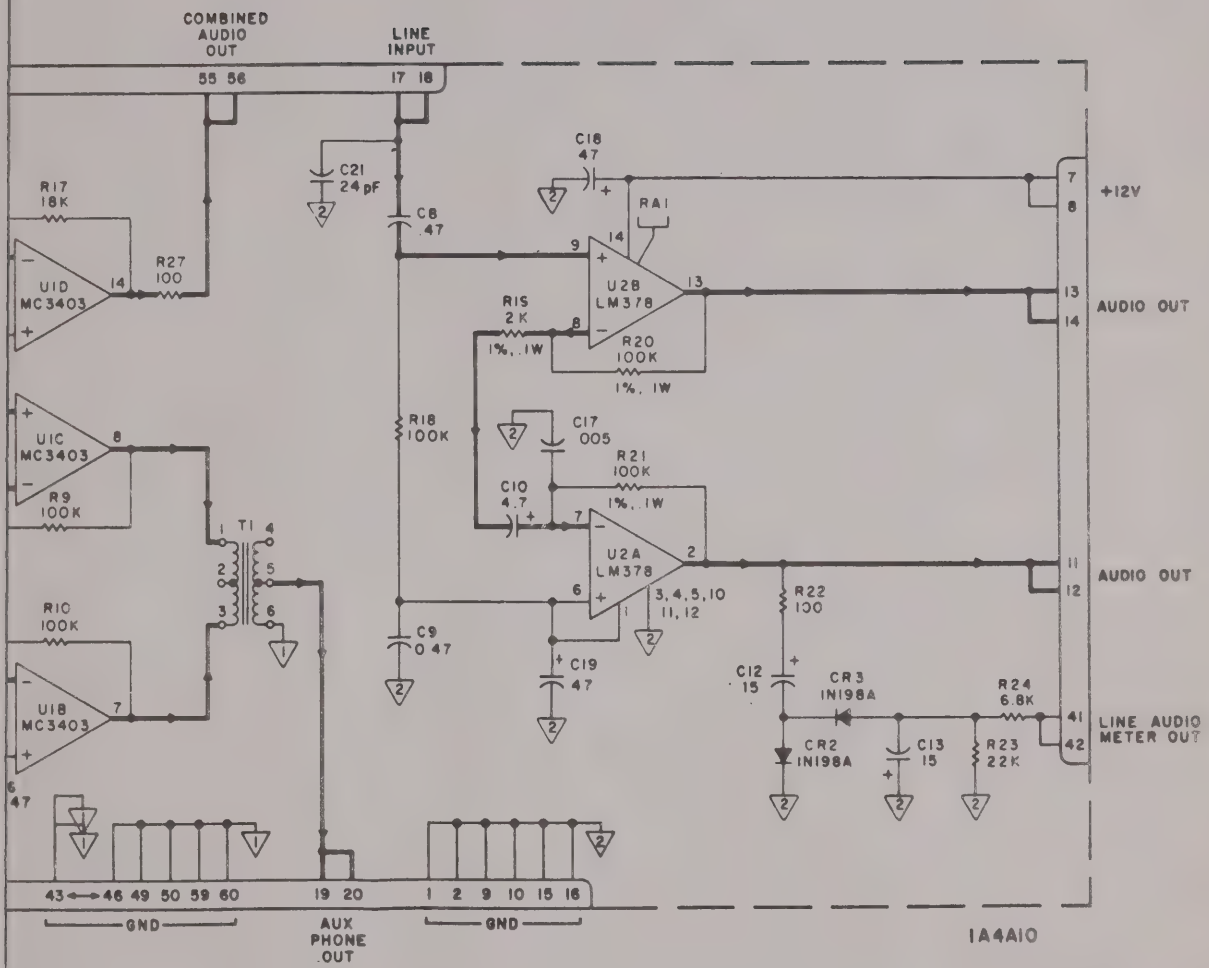
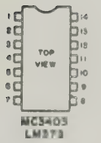


Figure FO-13. Pn 746001-2 Audio Amplifier (1A4A10), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN μF.

B. ——●—— MAJOR SIGNAL PATH



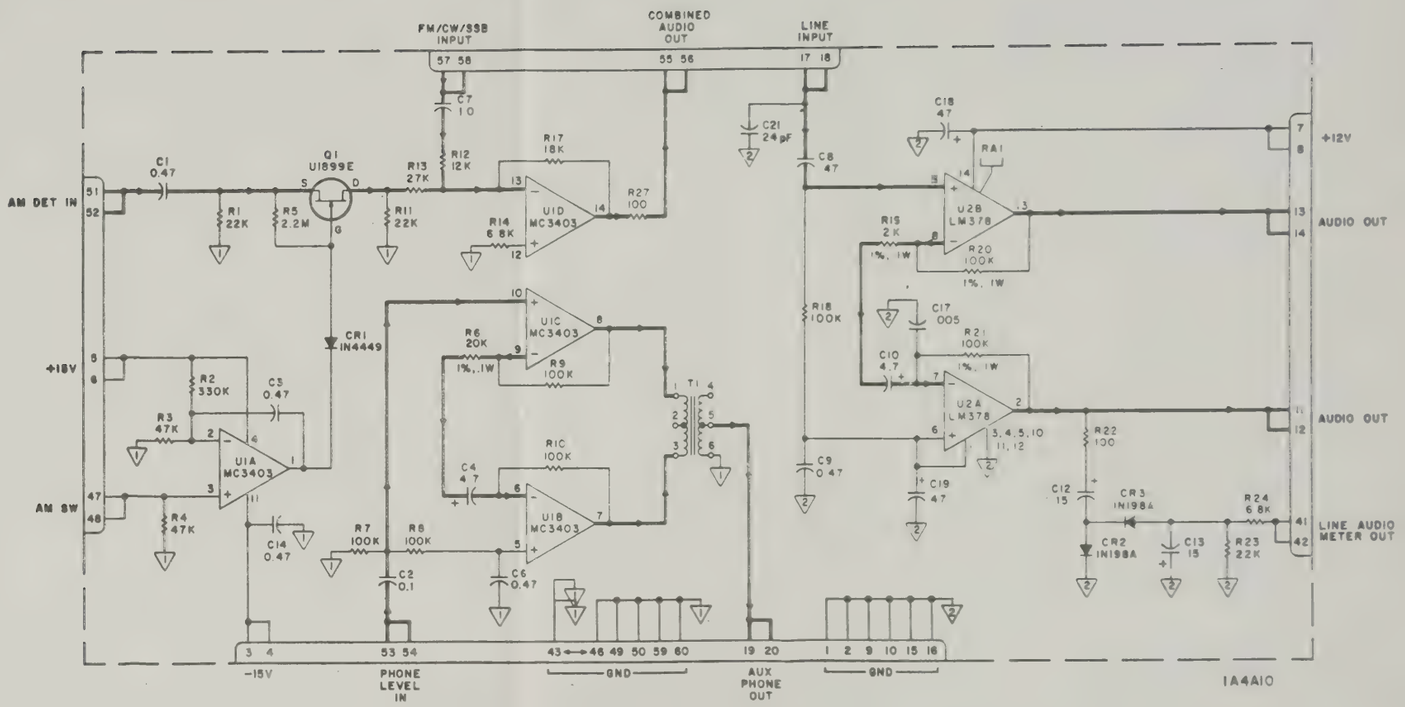


Figure FO-13. Pn 746001-2 Audio Amplifier (1A4A10), Schematic Diagram

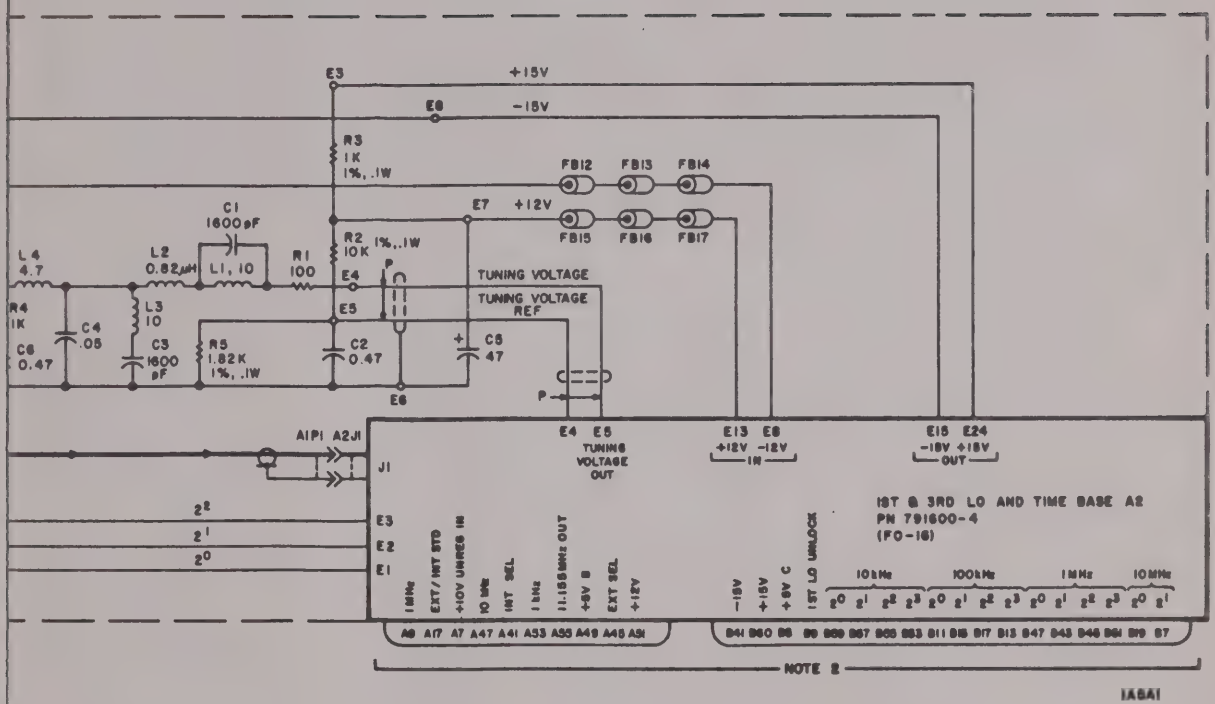


Figure FO-14. Pn 791630-4 1st and 3rd Lo Synthesizer (1A5A1), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W
   2) CAPACITANCE IS IN μF
   3) INDUCTANCE IS IN mH.
B. ⟶ MAJOR SIGNAL PATH.

SPECIFIC NOTES:

1. LEAD ARRANGEMENT FOR VR1 IS SHOWN IN DETAIL A.
2. ALPHANUMERIC DESIGNATORS ARE MODULE (A2) PINS. GND PINS FOR GND_1, GND_2, GND_3 ARE LISTED IN TABLE A.

DETAIL A

TABLE A

GND	MODULE PIN
GND_1	A48, 50, 52, 54, 56, 58, 60
GND_2	A2, 4, 6, 8, 10, 14, 16, 18, 20, 42, 44, 46
GND_3	B2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 42, 44, 46, 48, 50, 52, 54, 56, 58

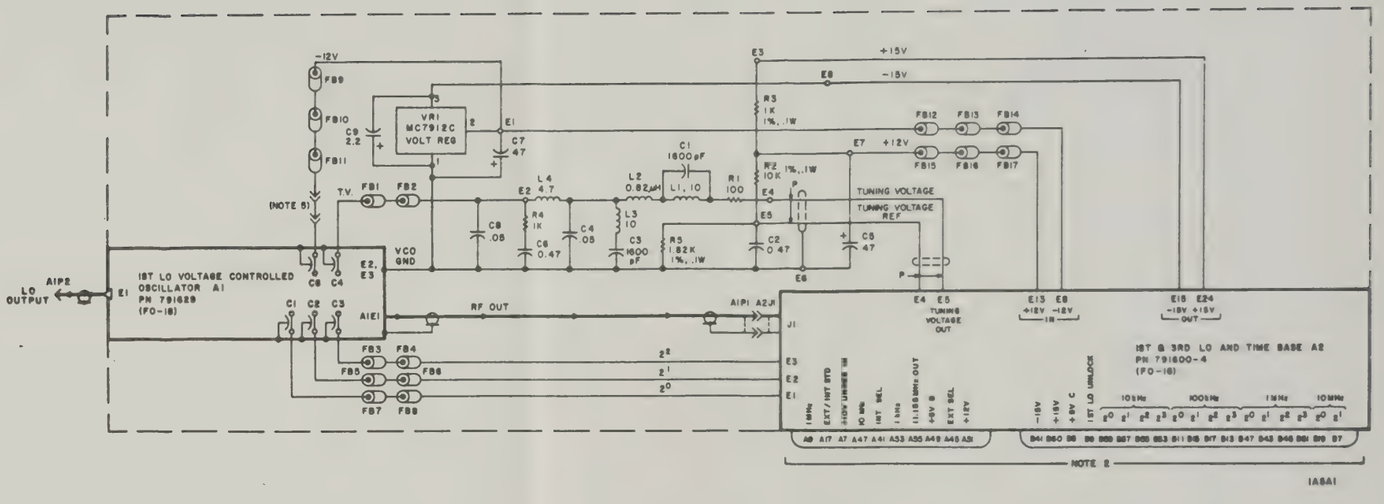


Figure FO-14. Pn 791630-4 1st and 3rd Lo Synthesizer (1A5A1), Schematic Diagram

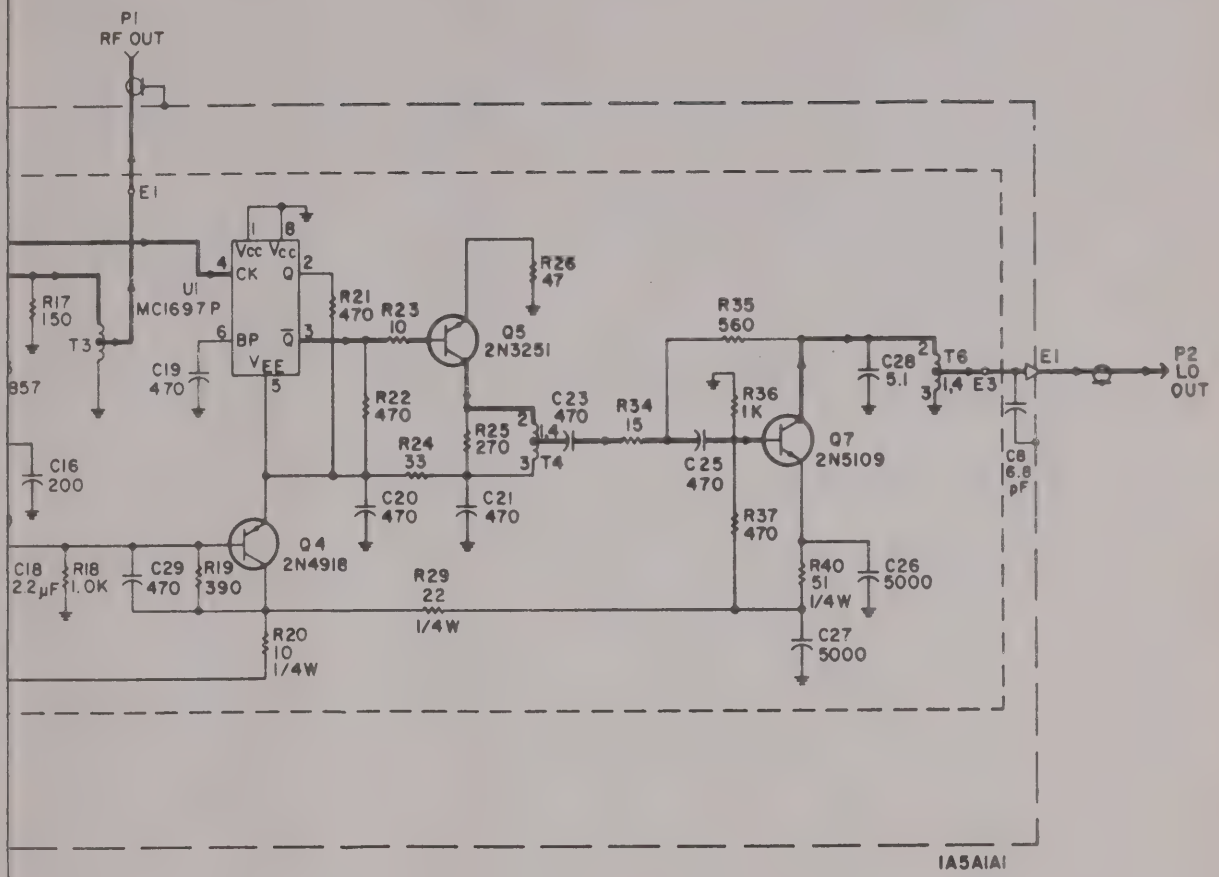


Figure FO-15. Pn 791629 1st Lo/Vco (1A5A1A1), Schematic Diagram

ENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED
1) RESISTANCE IS IN OHMS ±5%, 1/8W
2) CAPACITANCE IS IN pF.

B. ——— MAJOR SIGNAL PATH.

PECIFIC NOTES:

1. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7g)

MC1697P

TOP VIEW

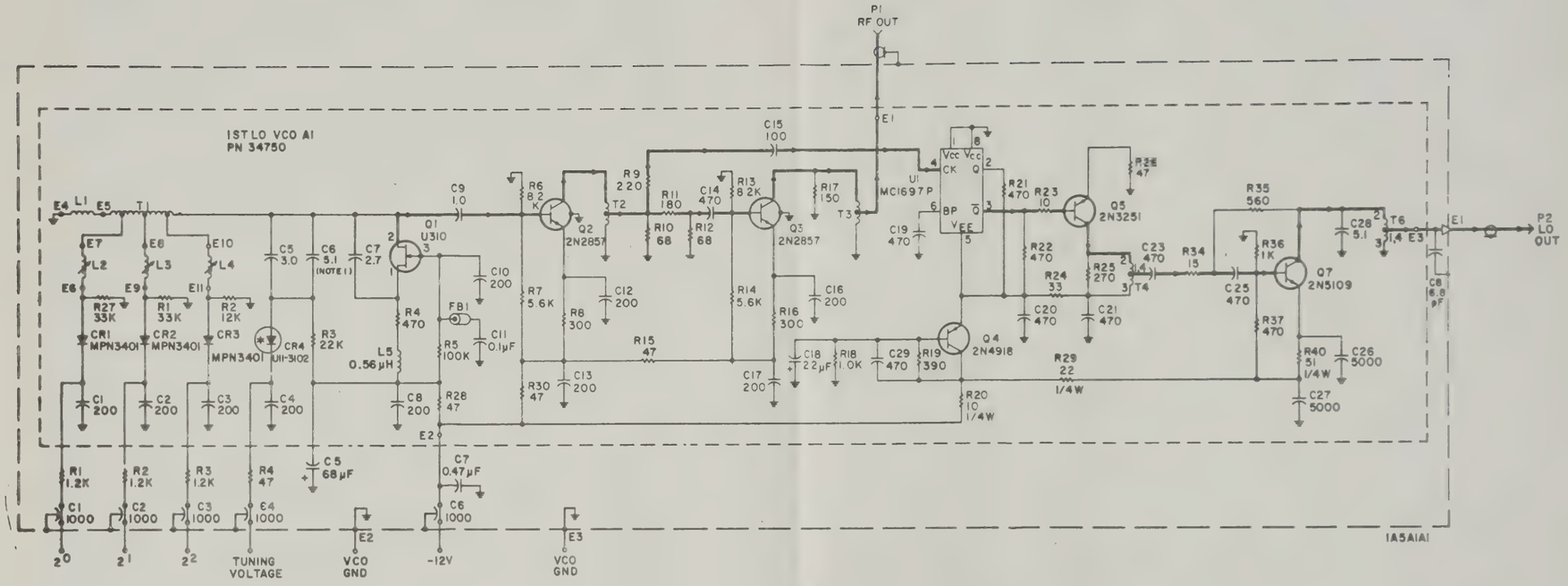
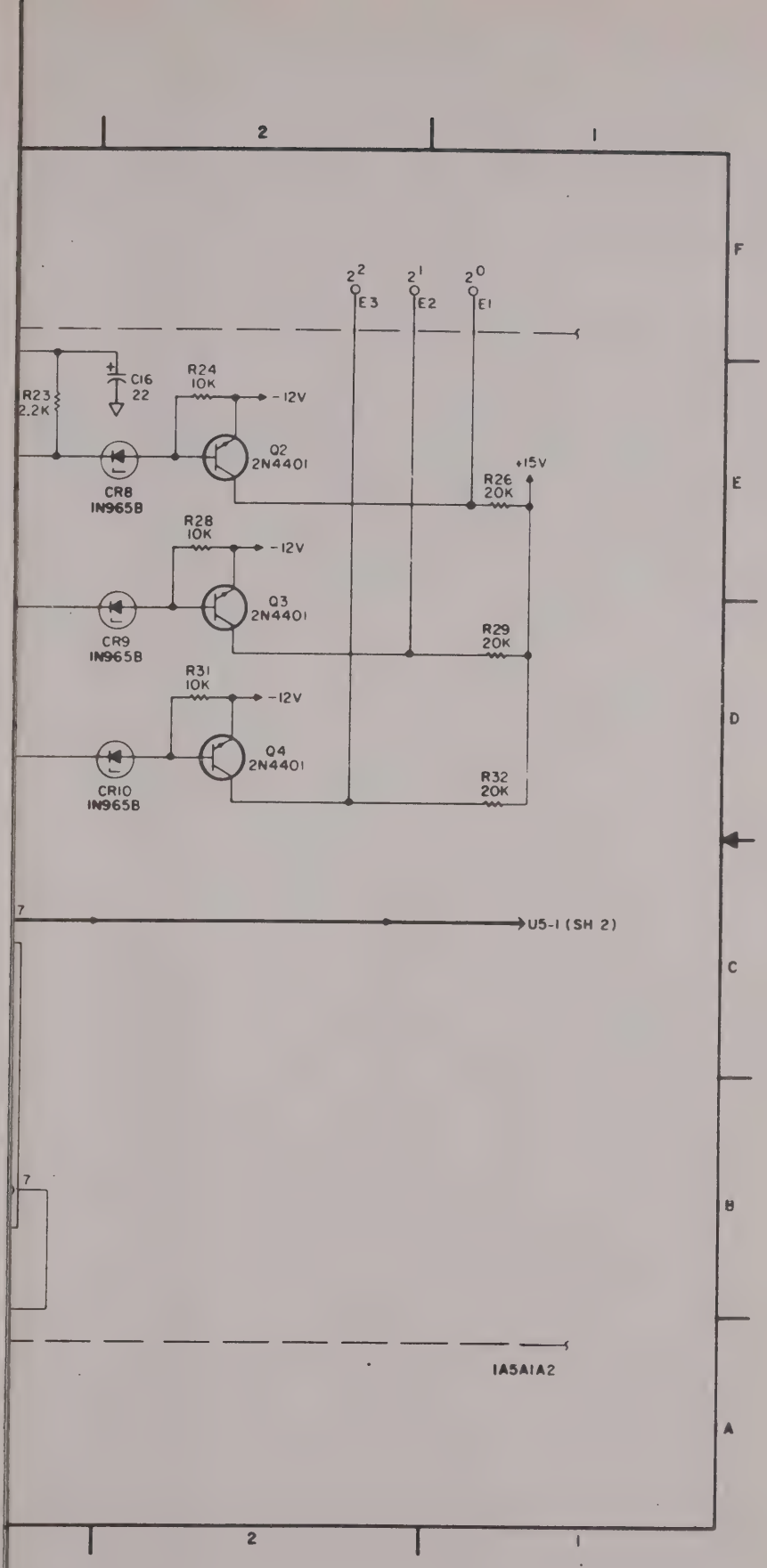


Figure FO-15. Pn 791629 1st Lo/Vco (1A5A1A1), Schematic Diagram



FO-16. Pn 791600-4 1st and 3rd Lo Synthesizer/Time Base (1A5A1A2), Schematic Diagram (Sheet 1 of 2)

PARTS LOCATION INDEX

REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE
C1	7B	C33	5C	Q2	2E	R19	8E	R45	4E	R73	8B	L11	4E
C2	7B	C34	6C	Q3	2D	R20	8E	R46	2E	R74	8D	U12	4B,3C
C3	7B	C35	4C	Q4	2D	R21	8E	R47	2E	R75	2E	U13	3E
C7	6B	C36	3C	Q5	7D	R22	8E	R48	5C	R76	2D	U14	6D
C8	6B	C37	3C	Q6	6E	R23	3E	R49	5D	R77	4D	U15	7E,6D
C9	3B	C38	6B	Q7	4C	R24	2E	R50	5C	R78	4D	U16	6C
C10	3B	C39	5B	Q8	3C	R25	6D	R51	5D	R79	4D	U17	8E
C11	3B	C41	6B	Q9,10	2D	R26	1E	R52	4D	R80	2C	U18	5E,4E
C12	3B	C42	3D	E1	7B	R27	3E	R53	4E	R81	2C	U19	5E,4E
C13	3B	C43	4C	E2	7C	R28	2E	R54	4D	R82	5E	U20	3E
C14	7B	C44	5B	E3	7C	R29	1D	R55	4C	R83	7C	U21	2D,2C
C15	7B	C45	4D	E4	7D	R30	3E	R56	4C	R84	6B	U22	2C,1C
C16	8E	CR1	8E	E5	7D	R31	2D	R57	3D	R85	6B	U23	7D,7C
C17	8C	CR2	8D	E6	8E	R32	1D	R58	3C	R86	2B	U24	5B,6B,6A
C18	8C	CR3	8D	E7	8E	R33	1D	R59	3C	RN1	5A	U25	5B
C19	8B	CR4	8D	E8	8C	R34	6B	R61	3D	T1	6C	Y1	4C
C20	7B	CR7	5C	E9	8D	R35	6B	R62	3D	U1	7B		
C21	7B	CR8	3E	E10	8D	R36	5E	R64	5B	L2	6B		
C22	7C	CR9	3D	E11	8D	R37	4E	R65	6B	U3	2B		
C23	6C	CR10	3D	E12	8D	R38	7E	R66	6B	L4	6D		
C25	3B	CR11	5B	E13	8D	R39	7D	R67	3D	U5	9D		
C26	1B	E1	1F	E14	8D	R40	7C	R68	5B	U6	4B,4A,8D,8E		
C28	6E	J1	8F	E15	8F	R41	6E	R69	6D	U7	7C		
C29	5D	J2	8B	E16	8E	R42	6E	R70	6D	U8	6C		
C30	5D	L1	7B	E17	8E	R43	6E	R71	6D	U9	6C		
C31	4D	L2	7C	E18	8E	R44	4E	R72	6D	U10	5C		
C32	5D	L3	4D										

NOTES:
A. UNLESS OTHERWISE SPECIFIED:
1) RESISTANCE IS IN OHMS, 1/8W, 5% W.
2) CAPACITANCE IS IN μF
B. ——— MAJOR SIGNAL PATH
——— MINOR SIGNAL PATH
C. VCC, GND PINS OF I.C.'S ARE SHOWN IN TABLE A.
D. LEAD ARRANGEMENT FOR I.C.'S ARE SHOWN IN TABLE A.

TABLE A

IC	REF DESIG	VCC			GND			DET	VCC2
		1	2	3	1	2	3		
MC4044P	U5			14			7	B	14
MC4044P	U12						7	B	14
MC12013L	U1			16			8	A	
MC12014L	U3			16			8	A	
SN74LS196N	U9			14			7	B	
SN74LS196	U2			14			7	B	
SN7400	U6			14			7	B	
82S123	U4			16			8	A	
SN74LS190	U8,U10			16			8	A	
SN74S74	U11			16			8	A	
SN74184	U13			16			8	A	
SN75140	U16	8			4			C	
74LS74	U21						7	B	14
8292	U5,U17	14			7			B	
8292	U18,U20	14					7	B	
741	U7							C	
SN74LS74	U12			14			7	B	
SN74125	U23	14			7			B	
SN74LS02	U24			14			7	B	

DETAIL A — TOP VIEW

DETAIL B — TOP VIEW

DETAIL C — TOP VIEW

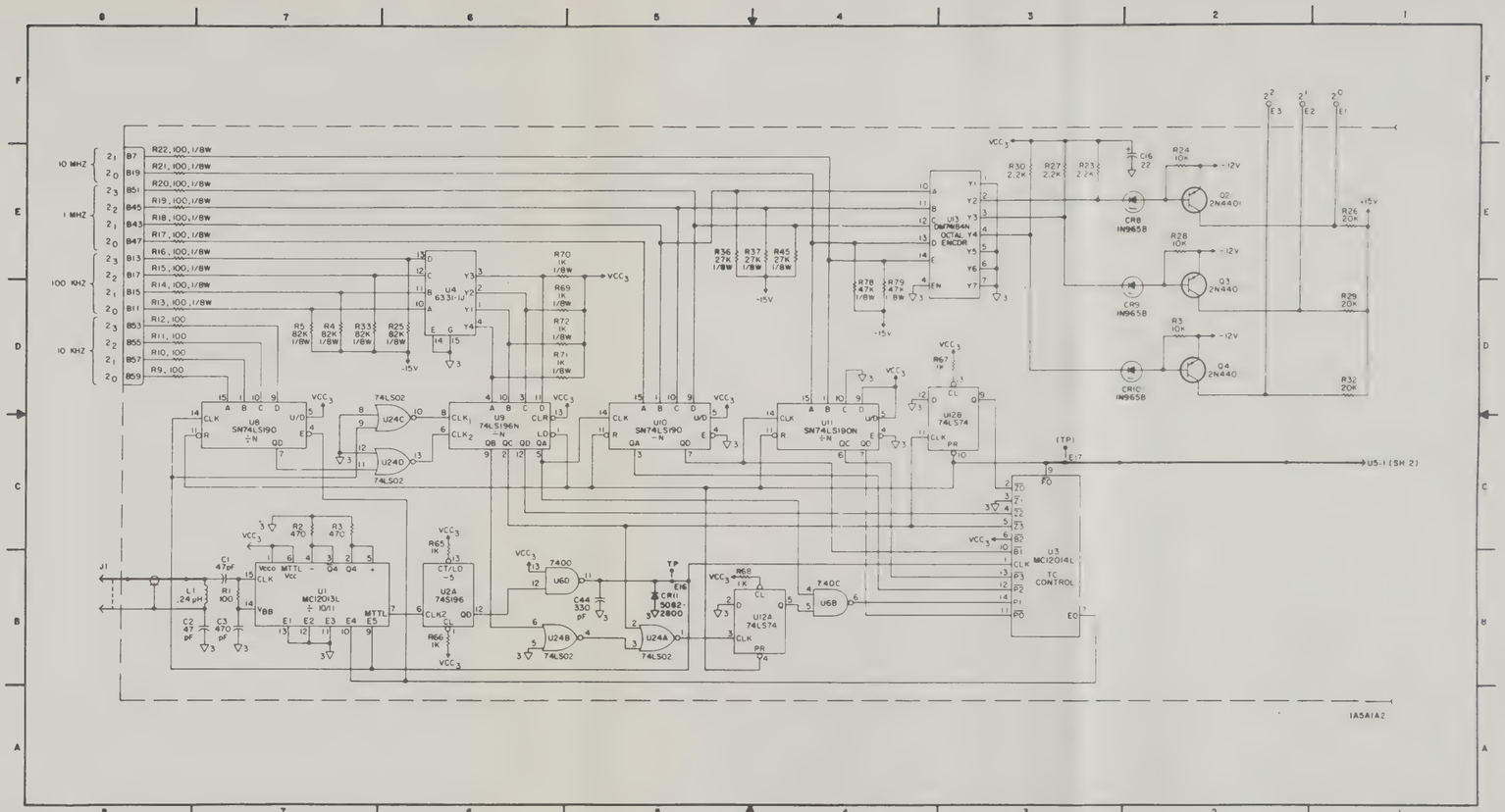
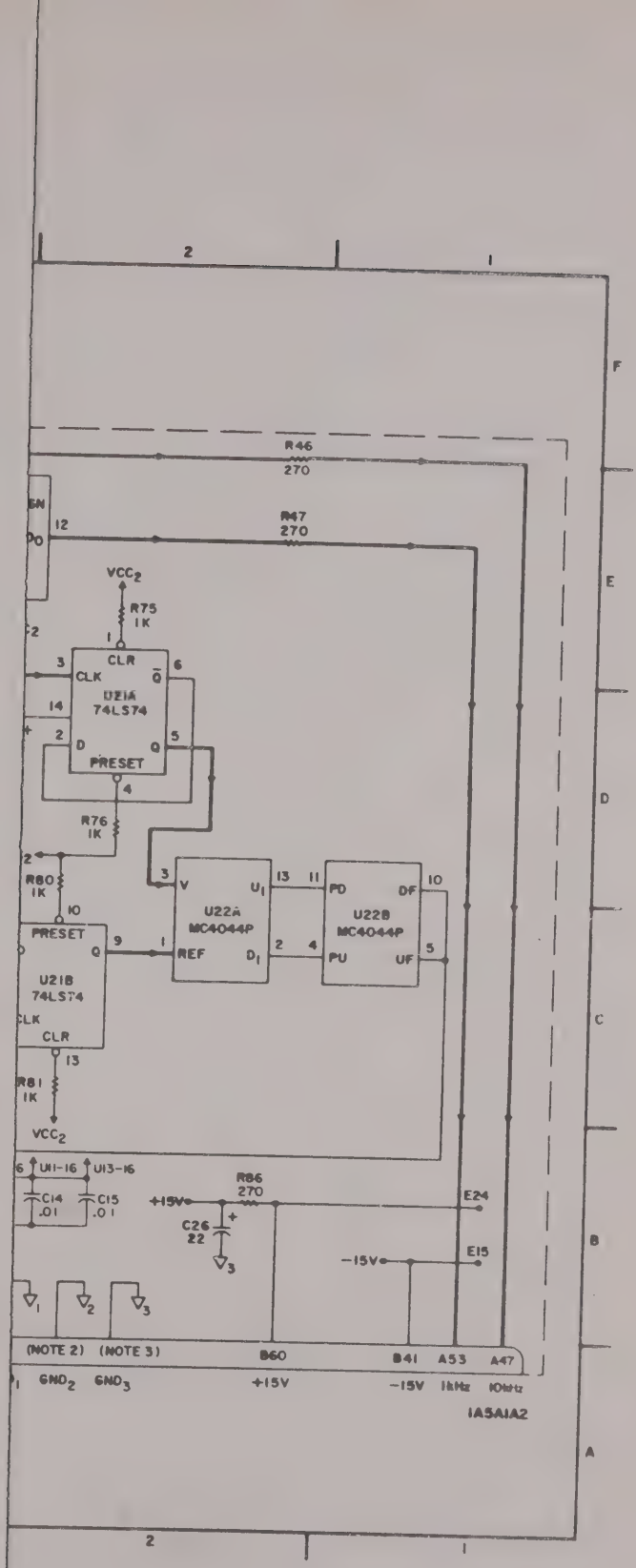


Figure FO-16. Pn 791600-4 1st and 3rd Lo Synthesizer/Time Base (1A5A1A2), Schematic Diagram (Sheet 1 of 2)



)1600-4 1st and 3rd Lo Synthesizer/Time Base
A1A2), Schematic Diagram (Sheet 2 of 2)

SPECIFIC NOTES:

1. PIN NO.S OF GROUND LEVEL ONE ARE A48,A50,A52,A54, A56 & A58.
2. GROUND LEVEL TWO ARE A2,A4,A6,A8,A10,A12,A14,A16, A18,A20,A42,A44,A46,A43.
3. GROUND LEVEL THREE ARE B2,B4,B6,B8,B10,B12,B14,B16, B18,B20,B42,B44,B46,B48,B50,B52,B54,B56 & B58.
4. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7g)

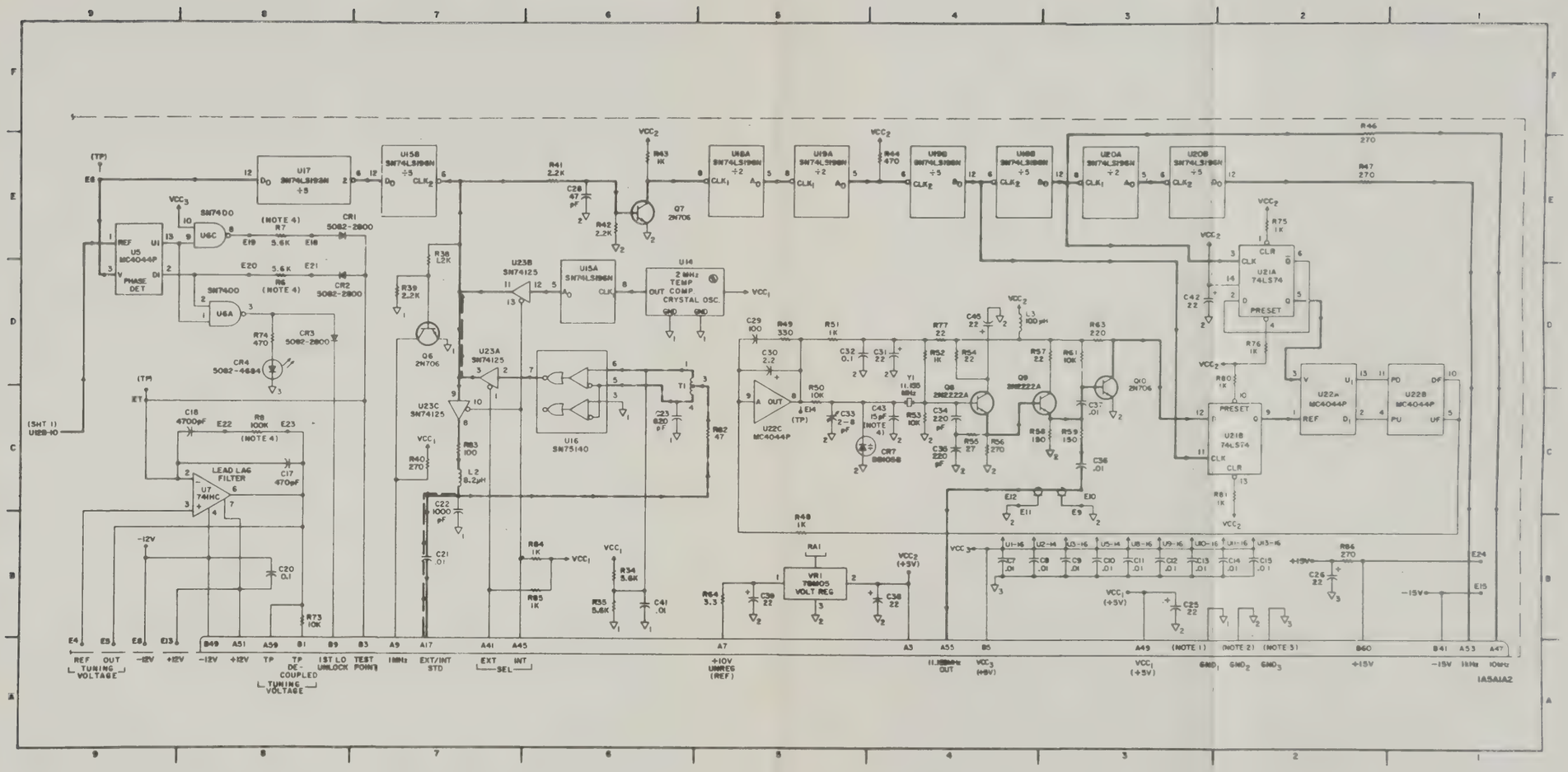


Figure FO-16. Pn 791600-4 1st and 3rd Lo Synthesizer/Time Base (1A5A1A2), Schematic Diagram (Sheet 2 of 2)

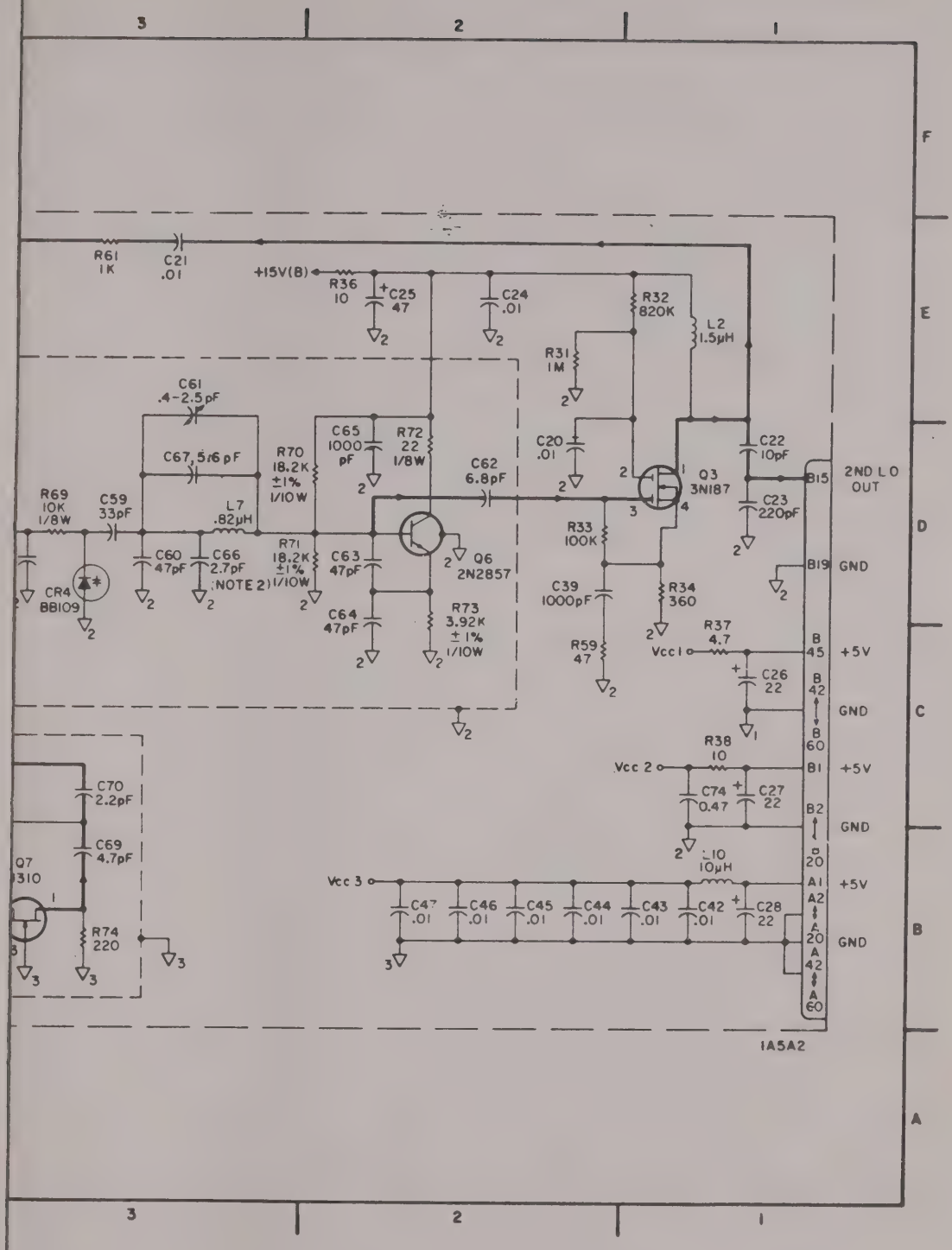


Figure FO-17. Pn 791601-2 2nd Lo Synthesizer (1A5A2), Schematic Diagram

PARTS LOCATION INDEX

REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE	REF DESIG	ZONE
C1	11C	C35	19D	C68	4B	R4	19D	R37	1C	R75	4B
C2	11B	C36	9C	C69	3B	R5	8E	R38	1C	R76	4B
C3	11B	C37	4B	C70	3C	R6	19E	R39	7D	R78	3C
C4	9E	C38	6D	C71	4B	R7	19E	R40	5B	R79	6B
C5	19E	C39	2D	C72	5D	R8	7E	R41	5B	R80	6D
C6	19E	C40	4B	C73	6B	R9	7E	R42	5B	U1	11D
C7	7E	C41	8E	C74	1C	R10	7D	R44	5B	U2	11E
C8	8E	C42	1B	C75	8C	R11	7E	R46	5B	U3	10E
C9	7D	C43	1B	C81	1B	R12	7D	R47	4B	U4	6D
C10	7E	C44	2B	C83	6D	R13	8E	R48	8C	U5	5D
C11	6E	C45	2B	C84	3D	R14	6D	R49	8C	U6	5C,6D
C12	5E	C46	2B	C85	3D	R15	7D	R50	10D	U7	10B
C13	5D	C47	2B	C86	6B	R16	7E	R51	9D	U8	9B
C14	5E	C48	9D			R17	6E	R52	9C	U9	8B
C15	5E	C49	9D			R18	6E	R53	7C	U10	7B
C16	4D	C50	9D			R19	6E	R54	7D	U11	8B,C,7B
C17	4D	C51	8E			R20	6E	R55	7D	U12	8B,3B
C18	4D	C52	8E			R21	6E	R59	7C	U14	11C
C19	4D	C53	8E			R23	5E	R60	5B	U15	10C
C20	3D	C54	8D			R24	5D	R61	3D	U16	7C
C21	3E	C55	6E			R25	5D	R63	10E	U17	6C
C22	1D	C56	9D			R26	5E	R64	4E	U19	5C
C23	1D	C57	9E			R27	4B	R65	9D	U20	7B
C24	2E	C58	3D			R28	4B	R66	8E	VR1	5B
C25	2E	C59	3D			R29	4D	R67	8E		
C26	1C	C60	3D			R30	4D	R68	8D		
C27	1B	C61	3D			R31	3E	R69	3D		
C28	1B	C62	3D			R32	1E	R70	3D		
C29	5B	C63	3D			R33	3D	R71	2D		
C30	5B	C64	2C			R34	1D	R72	3D		
C31	8C	C65	3D			R35	4D	R73	3C		
C32	8C	C66	3D			R36	3E	R74	3B		
C33	8C	C67	3D			R3	11B				
C34	8C					R2	11B				

GENERAL NOTES:
A. UNLESS OTHERWISE SPECIFIED:
1) RESISTANCE IS IN OHMS, 5%, 1/4W.
2) CAPACITANCE IS IN μF.
B ——— MAJOR SIGNAL PATH.

SPECIFIC NOTES:
1 PIN ARRANGEMENTS & POWER CONNECTIONS FOR ICS ARE GIVEN IN TABLE I.
2 NOMINAL VALUE. FINAL VALUE FACTORY SELECTED. (REFER TO PARAGRAPH 6-7g)

TABLE I

IC TYPE	REF DES	DETAIL	PIN	Vcc 1 PIN	Vcc 2 PIN	Vcc 3 PIN	▽1	▽2	▽3
MC4044	U1	B	14	4	-	7			
74173	U2	B	16	8	-	16			
4574	U3	B	8	4	-	7			
196	U4	C	-	-	-	-			
393	U5	C	-	-	-	-			
MC4044	U6	B	-	14	-	7			
74LS190	U7,U8	A	16	-	-	16			8
74LS191	U9,U10	A	16	-	-	16			8
74LS00	U11	B	14	-	-	7			7
MC4044	U12	B	14	-	-	7			7
74LS168	U14	A	16	-	-	16			8
MC12013	U15	A	16	-	-	16			8
MC12017	U16	A	16	-	-	16			8
74LS196	U17,U18	B	14	-	-	14			7

DETAIL A — TOP VIEW

DETAIL B — TOP VIEW

DETAIL C — BOTTOM VIEW

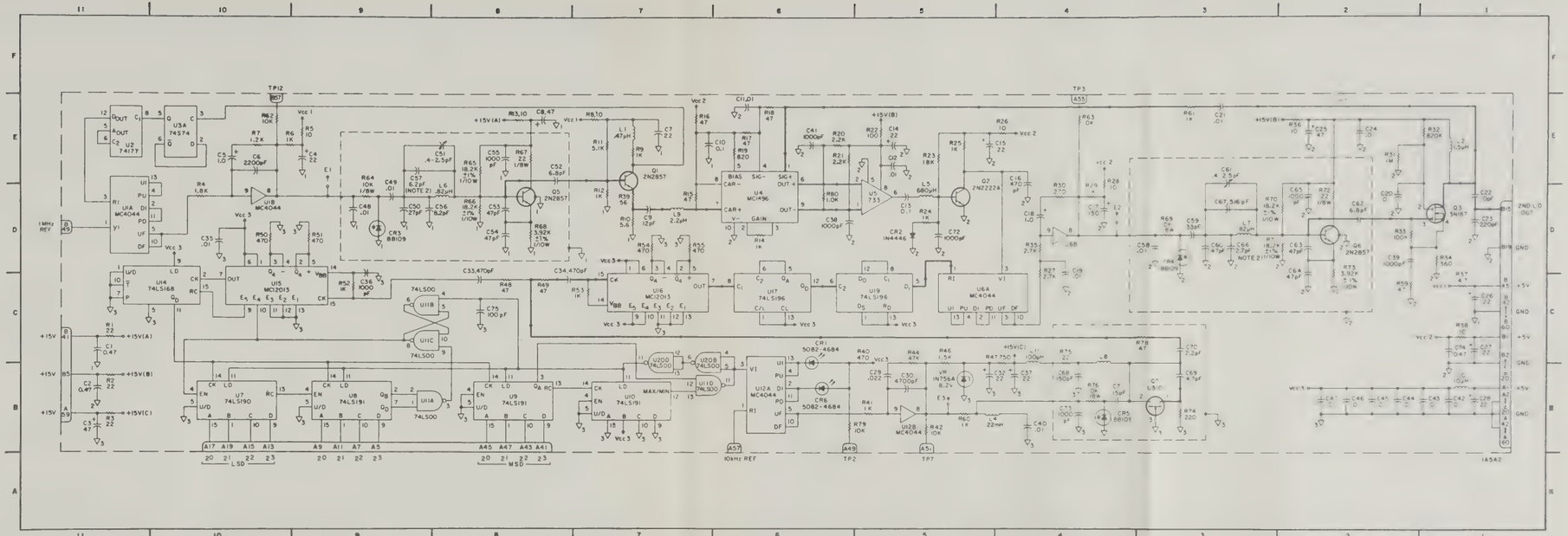


Figure FO-17. Pn 791601-2 2nd Lo Synthesizer (1A5A2), Schematic Diagram

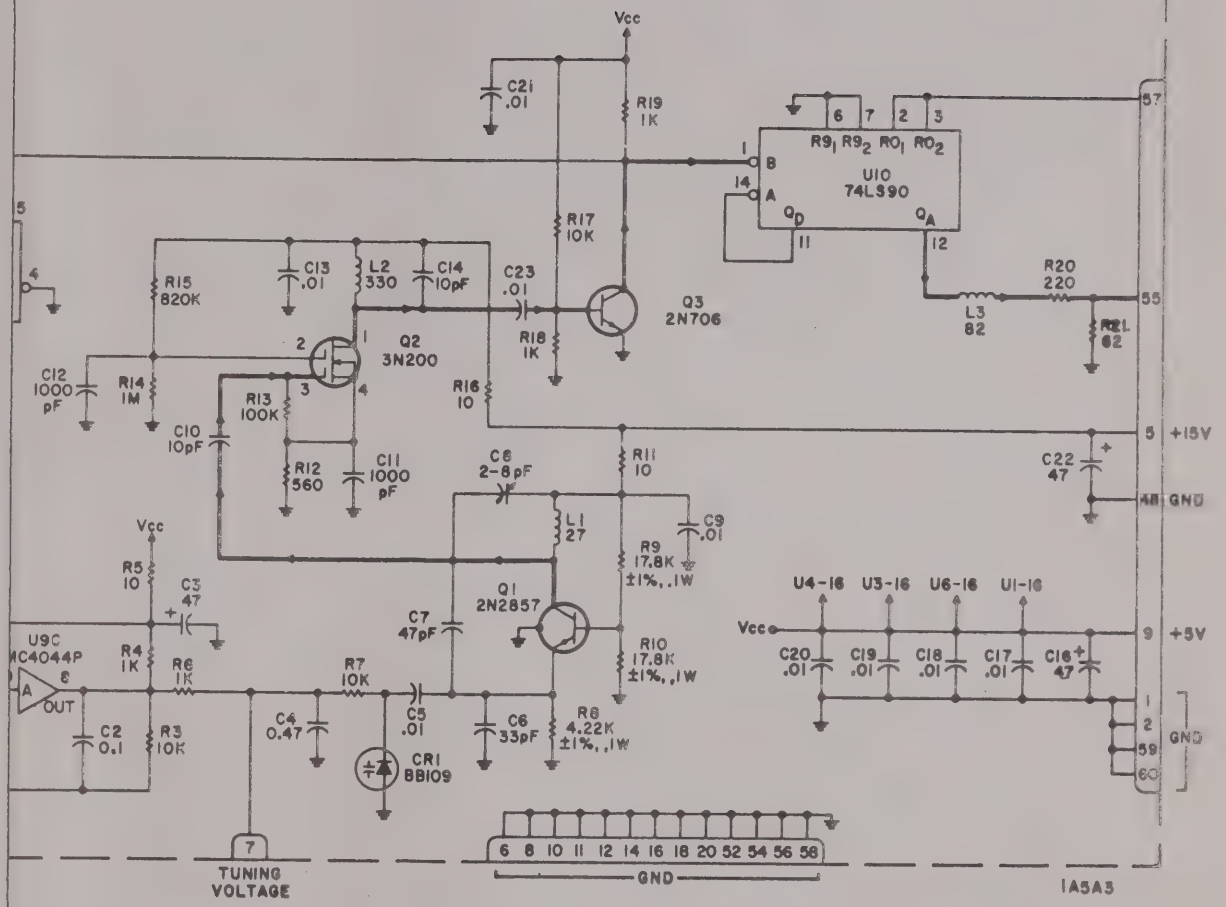


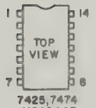
Figure FO-18. Pn 791576-2 Bfo Synthesizer (1A5A3), Schematic Diagram

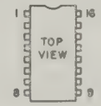
GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED:
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN μF.
   3) INDUCTANCE IS IN μH.

B. ⟵ MAJOR SIGNAL PATH

I/C	REF DESIG	Vcc	GND
74LS190	U1,U2,U3,U4	16	8
7425	U5,U7	14	7
74LS11	U6	14	7
7474	U8	14	7
MC4044P	U9	14	7
74LS90	U10	5	10





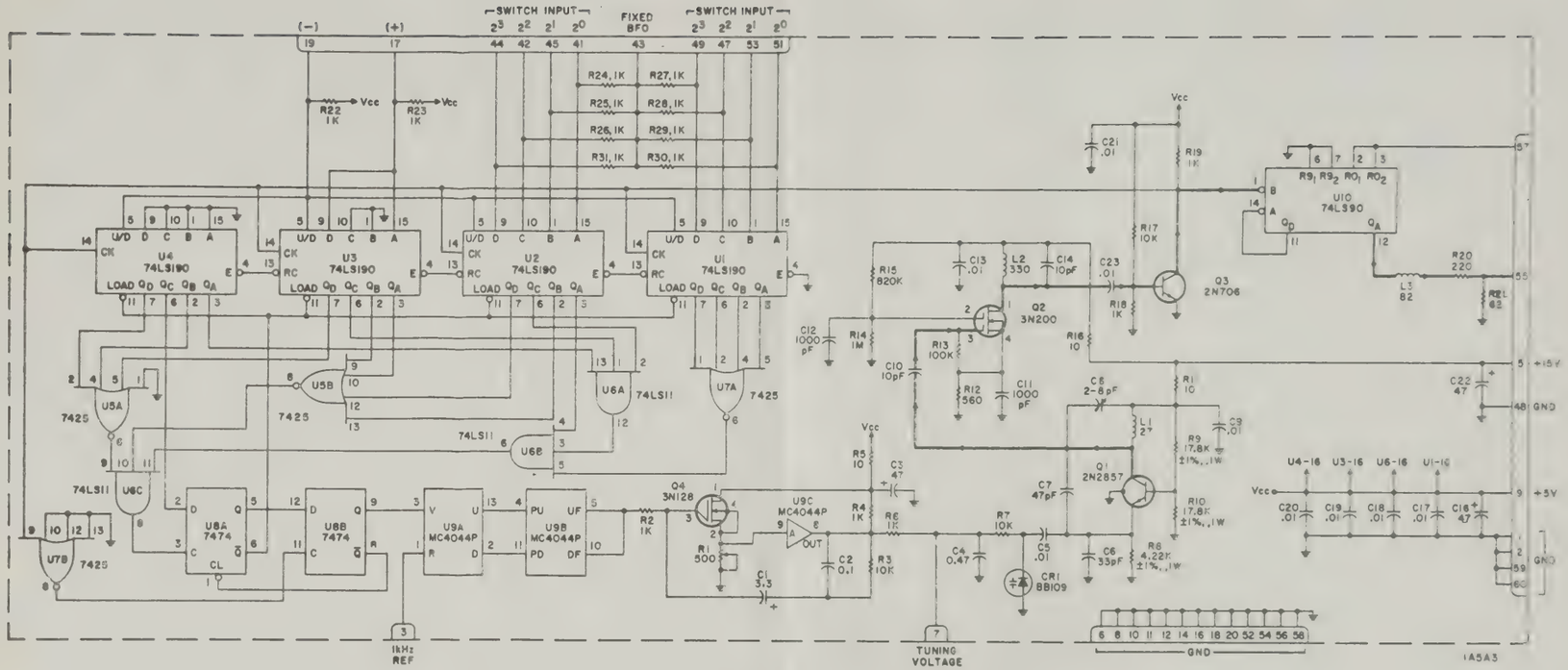


Figure FO-18. Pn 791576-2 Bfo Synthesizer (1A5A3), Schematic Diagram

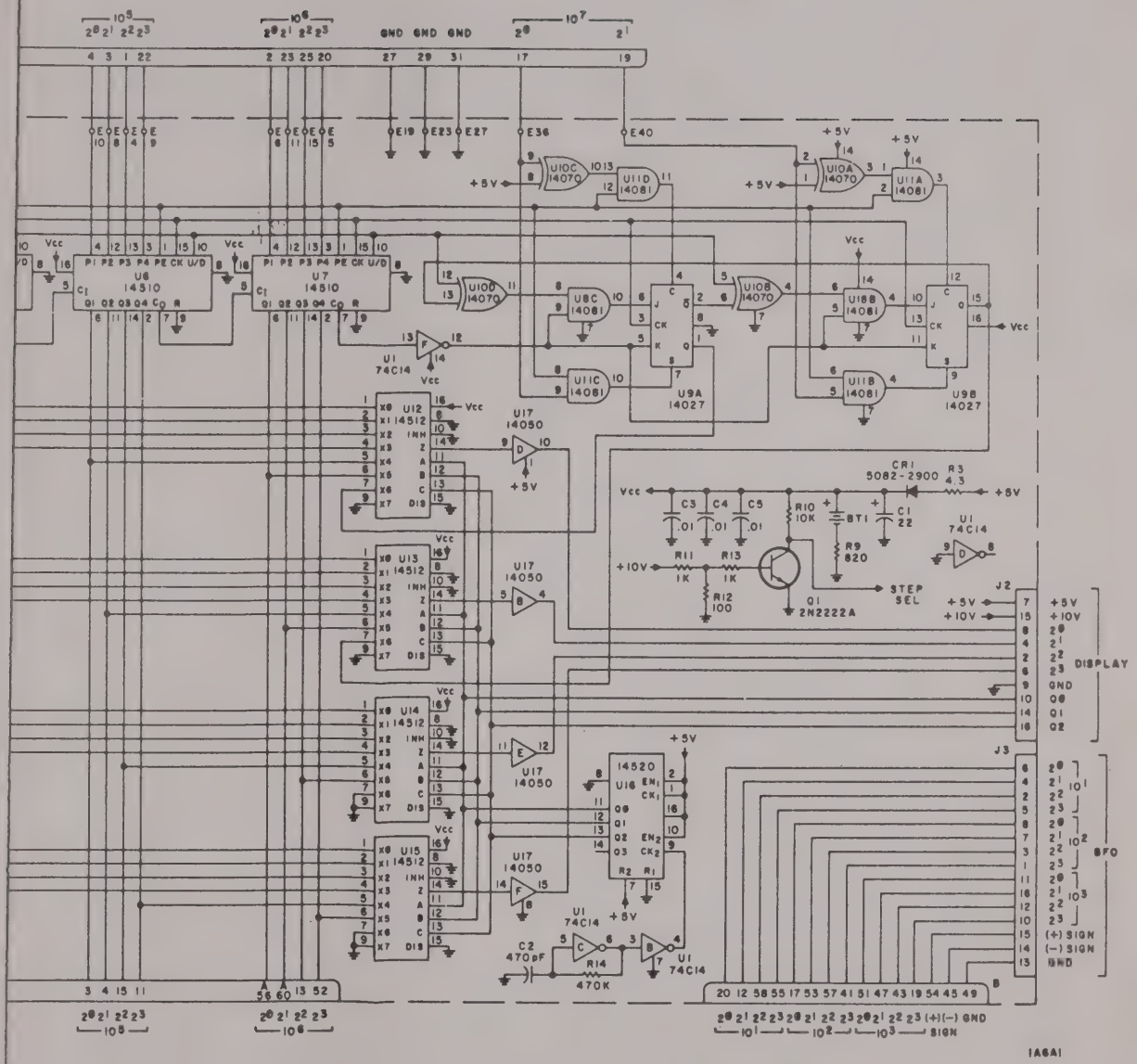


Figure FO-19. Pn 791575-5 Manual Tuning Up/Down Counter (1A6A1), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED
   1) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   2) CAPACITANCE IS IN μF.

SPECIFIC NOTES:

1. REMOVE JUMPER WIRE JW1 BETWEEN E41 & E42 FOR EXTERNALLY ACTIVATED REMOTE CONTROL. THE PRESENCE OF THE JUMPER WIRE PROVIDES FRONT PANEL ACTIVATED REMOTE CONTROL.

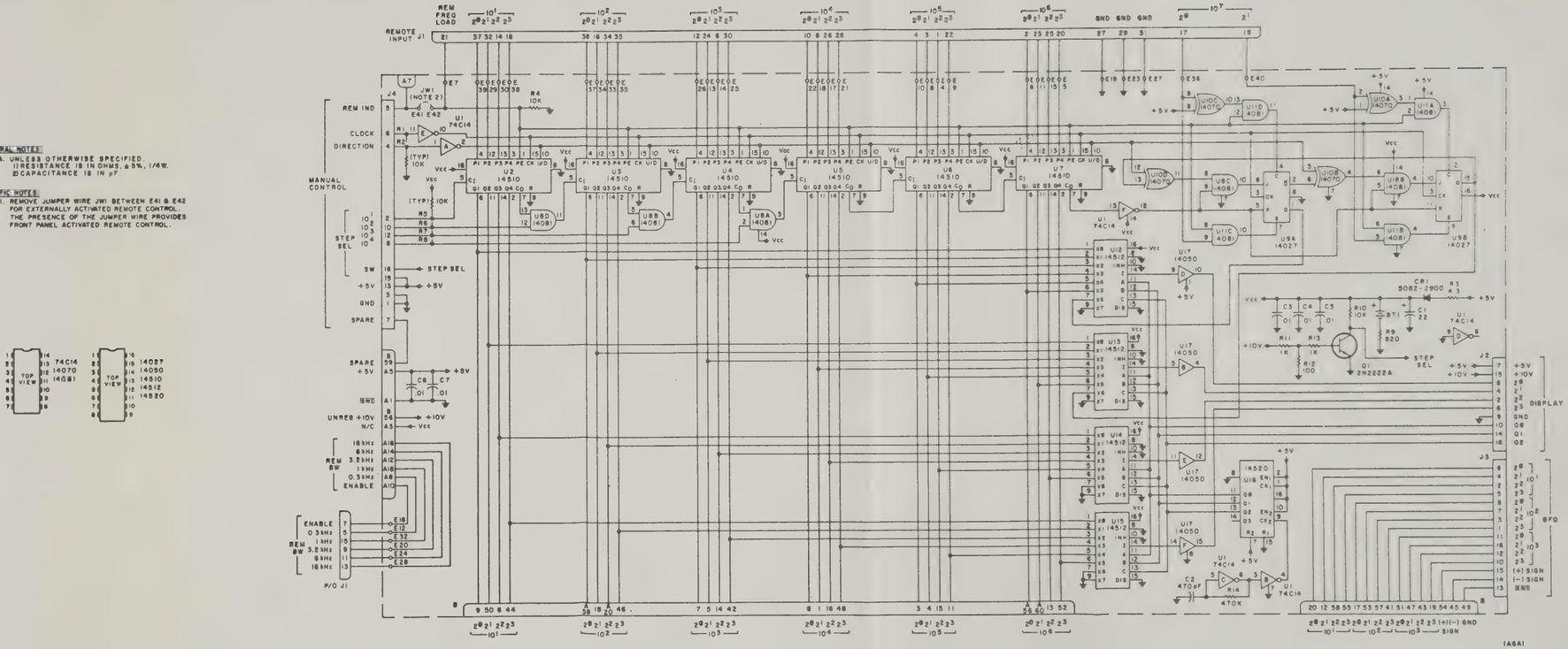


Figure FO-19. Pn 791575-5 Manual Tuning Up/Down Counter (1A6A1), Schematic Diagram

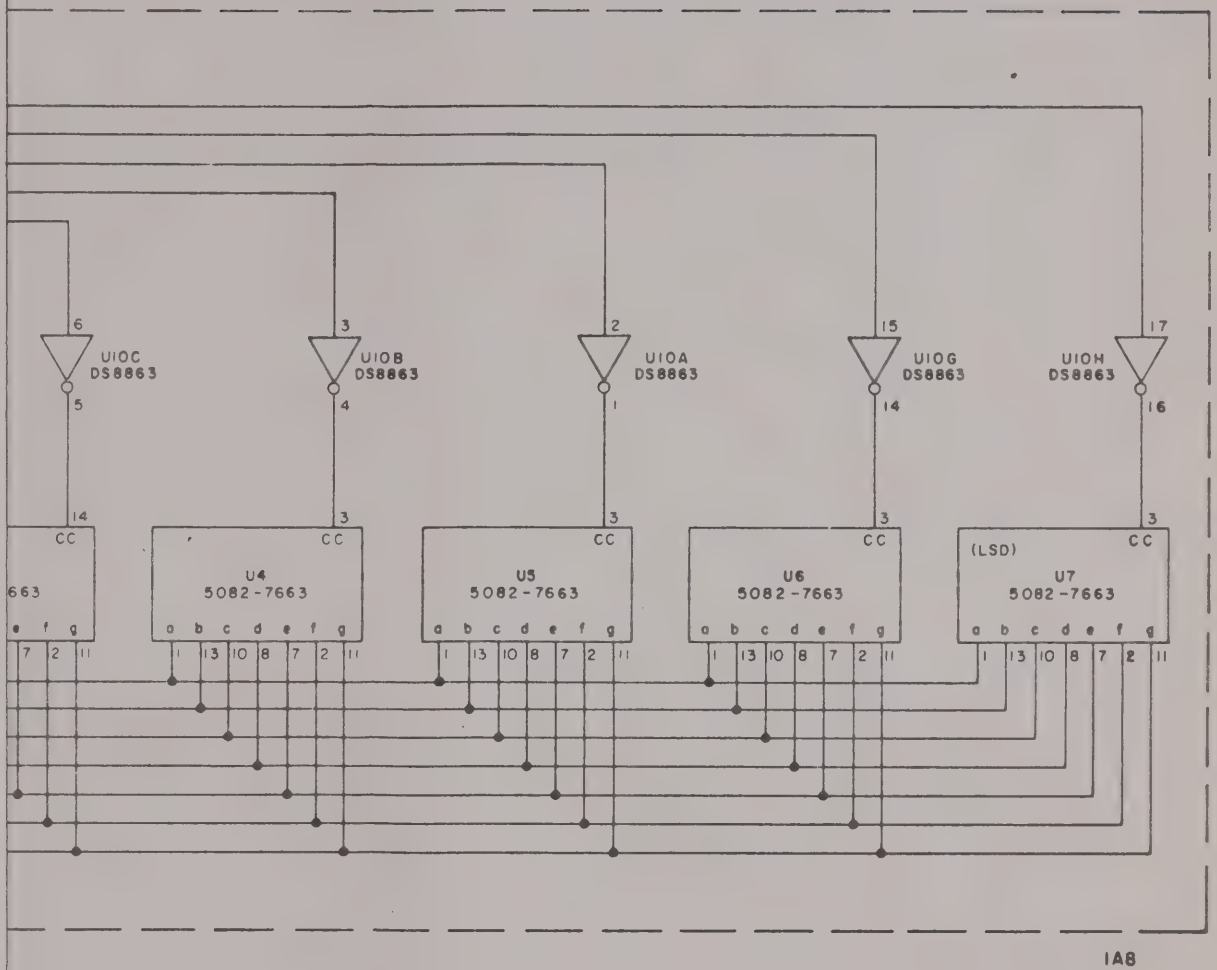


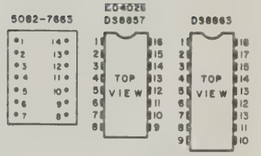
Figure FO-20. Pn 791578-2 Frequency Display (1A8), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED, RESISTANCE IS IN OHMS, ±5%, 1/4W.

SPECIFIC NOTES:

1. U10 PIN 16 IS +5V; U10 PIN 8 IS GND.



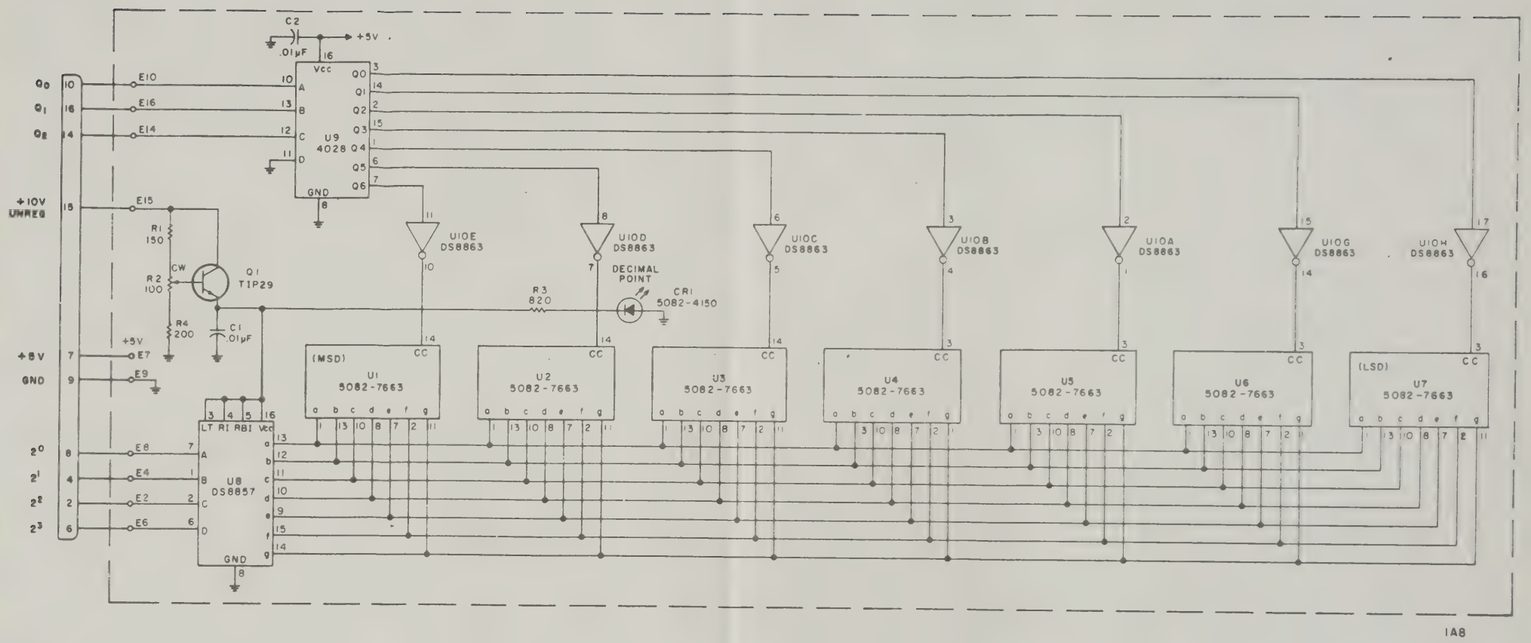


Figure FO-20. Pn 791578-2 Frequency Display (1A8), Schematic Diagram

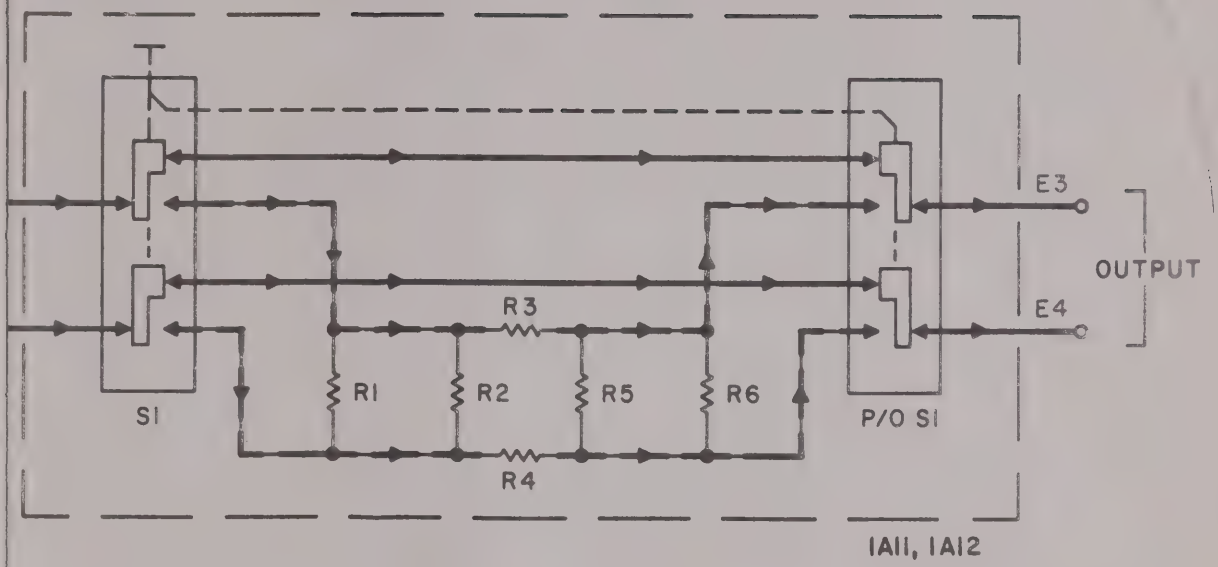


Figure FO-21. Pn 796094-1 and 796094-2 Switchable Audio Attenuator (1A11 and 1A12), Schematic Diagram

GENERAL NOTES:

A. UNLESS OTHERWISE SPECIFIED: RESISTANCE IS IN OHMS, ±5%, 1/2W.
B. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A.
C. ——▶—— MAJOR SIGNAL PATH
– – ▶ – – MINOR SIGNAL PATH

TABLE A

TYPE	R1	R2	R3	R4	R5	R6	ATTEN	IMPD
796094-1	33 2W	36 2W	120	120	33	36	30dB	16 OHMS
796094-2	750 1/4W	NOT USED	1.5K 1/4W	1.5K 1/4W	750 1/4W	NOT USED	20dB	600 OHMS

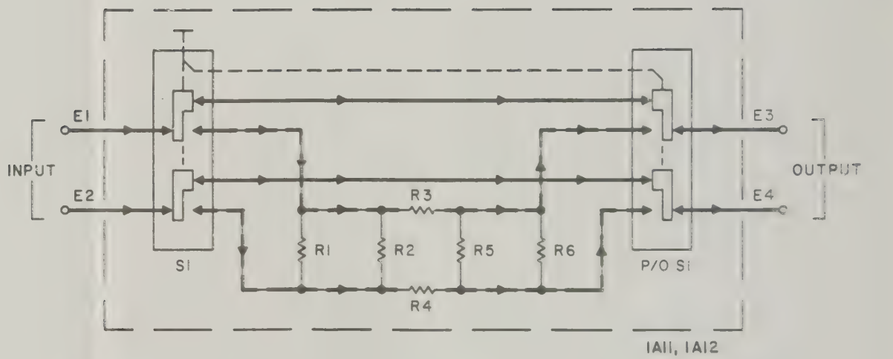
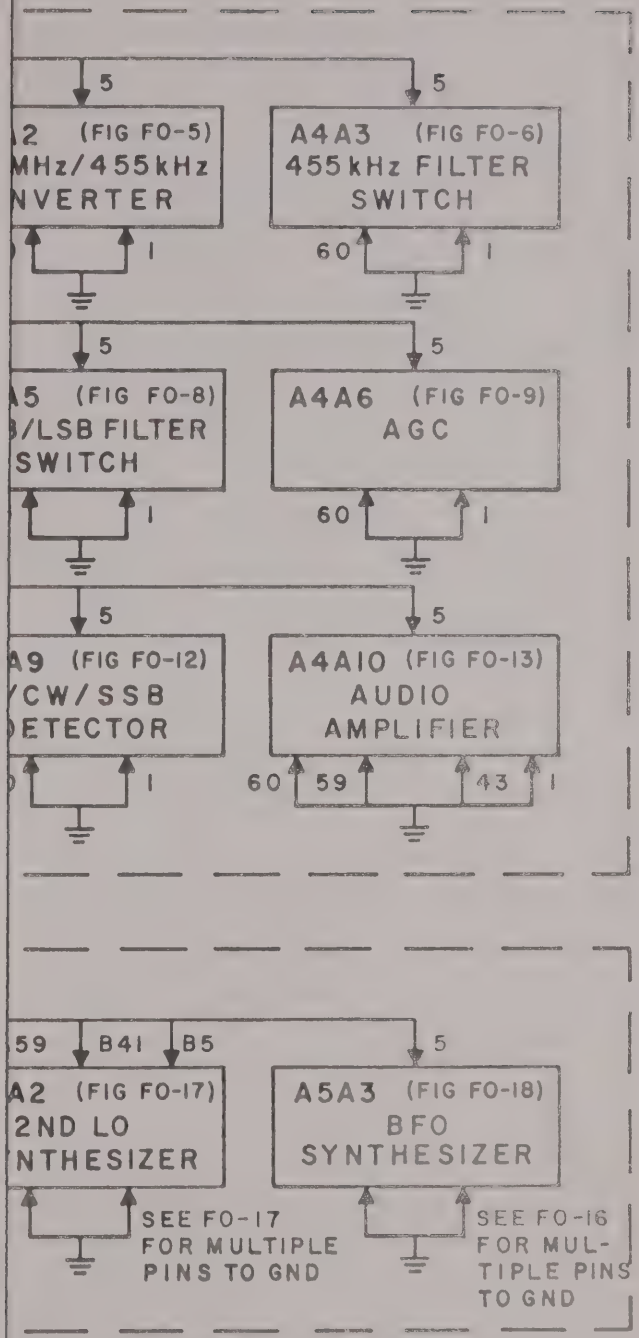


Figure FO-21. Pn 796094-1 and 796094-2 Switchable Audio Attenuator (1A11 and 1A12), Schematic Diagram



O-22. Receiver Power Distribution Diagram (Sheet 1 of 3)

GENERAL NOTES:

A. REFER TO FIG FO-1, SHEET 1, FOR AC POWER DISTRIBUTION.
B. ALL VOLTAGES REFERENCED TO CHASSIS GND.
C. ALL MOTHER BOARD COMMON PRINTED CIRCUIT PATHS BOLTED TO CHASSIS GND.
D. DC VOLTAGE RANGES:

NOMINAL	ALLOWABLE RANGE
+15V REG	+15 ±0.75V
−15V REG	−15 ±0.75V
+ 5V REG	+ 5 ±0.25V
+12V REG	+12 ±0.60V
+10V UNREG	+10 V MIN

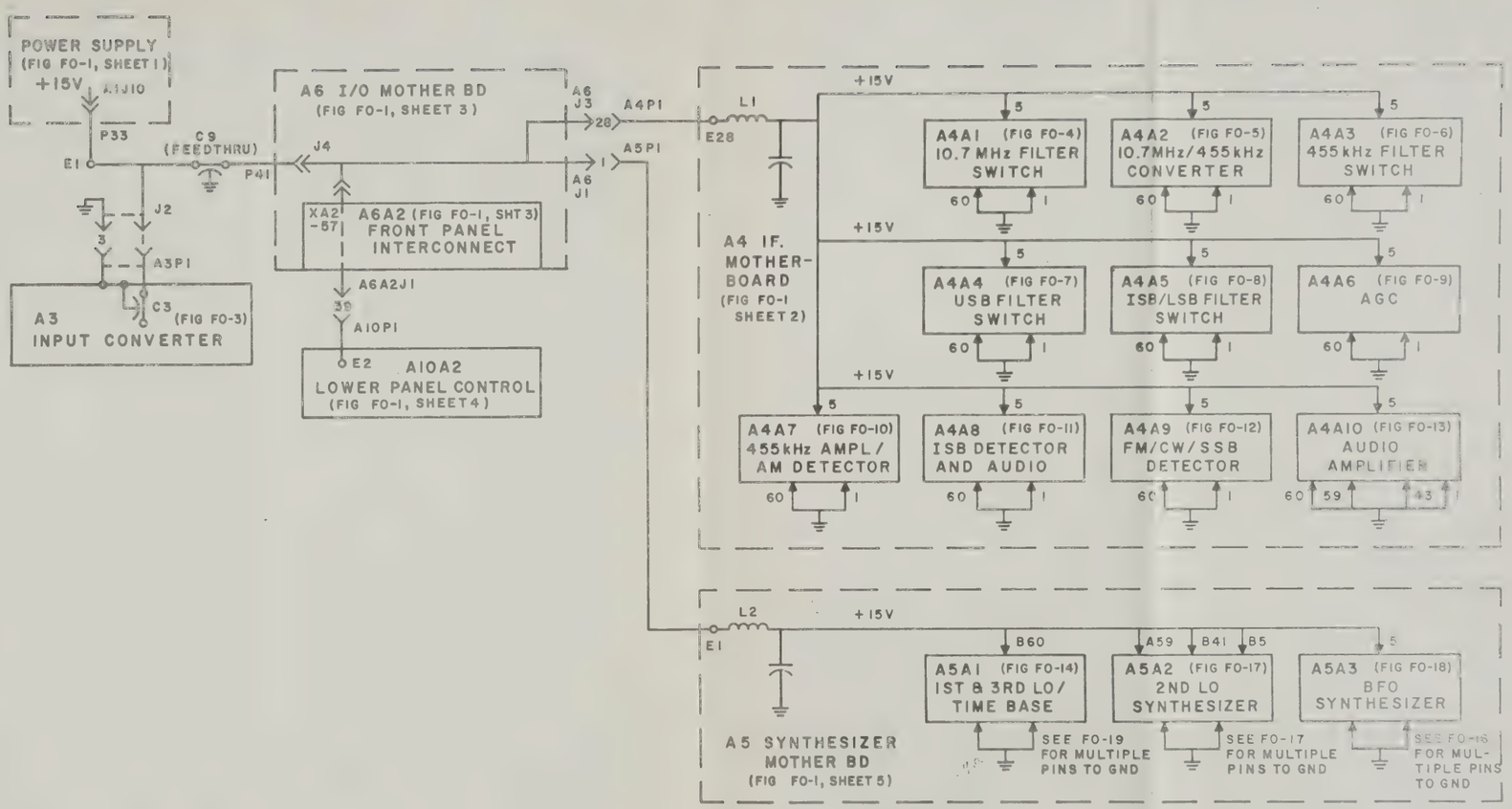


Figure FO-22. Receiver Power Distribution Diagram (Sheet 1 of 3)

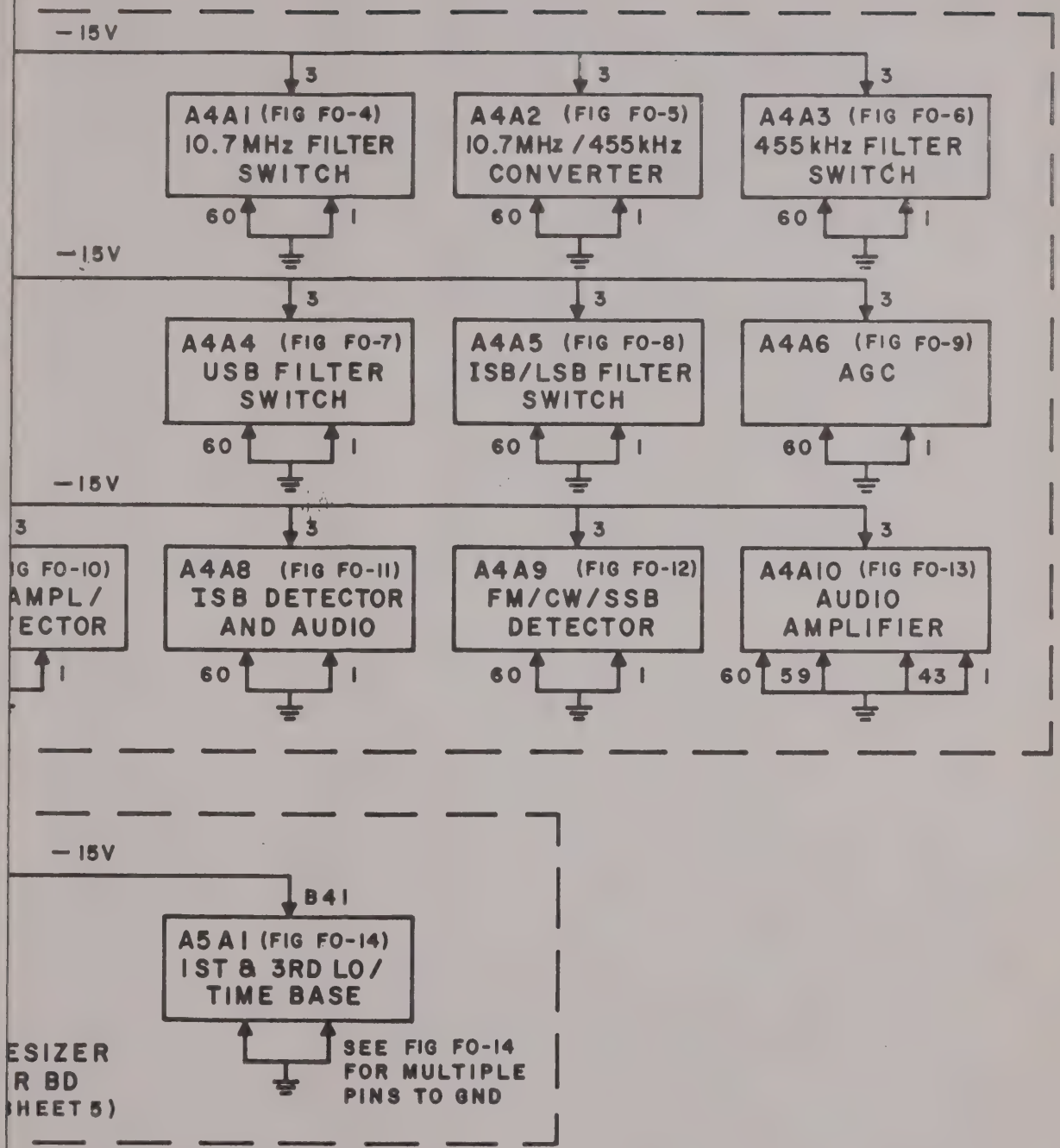


Figure FO-22. Receiver Power Distribution Diagram (Sheet 2 of 3)

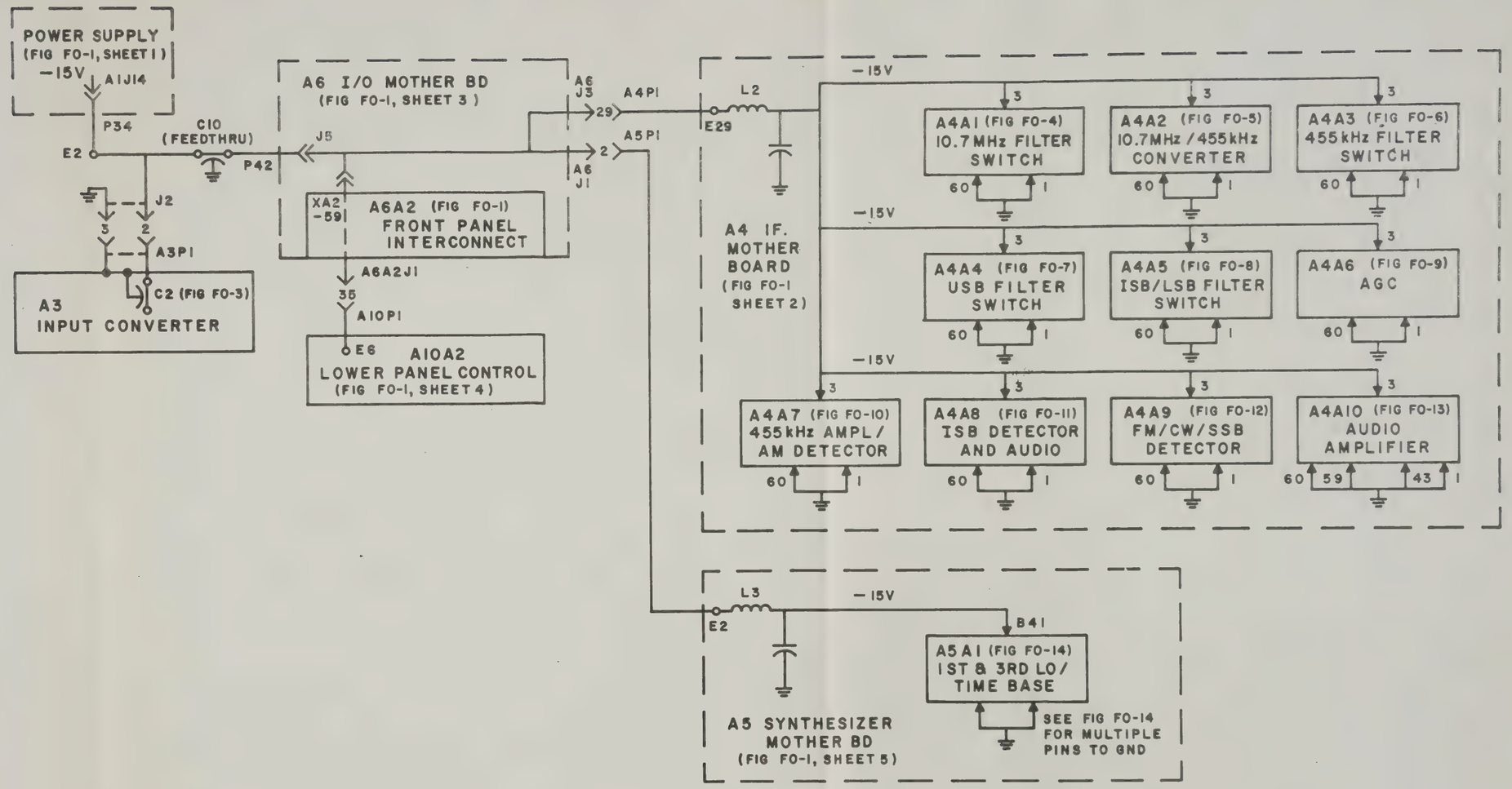
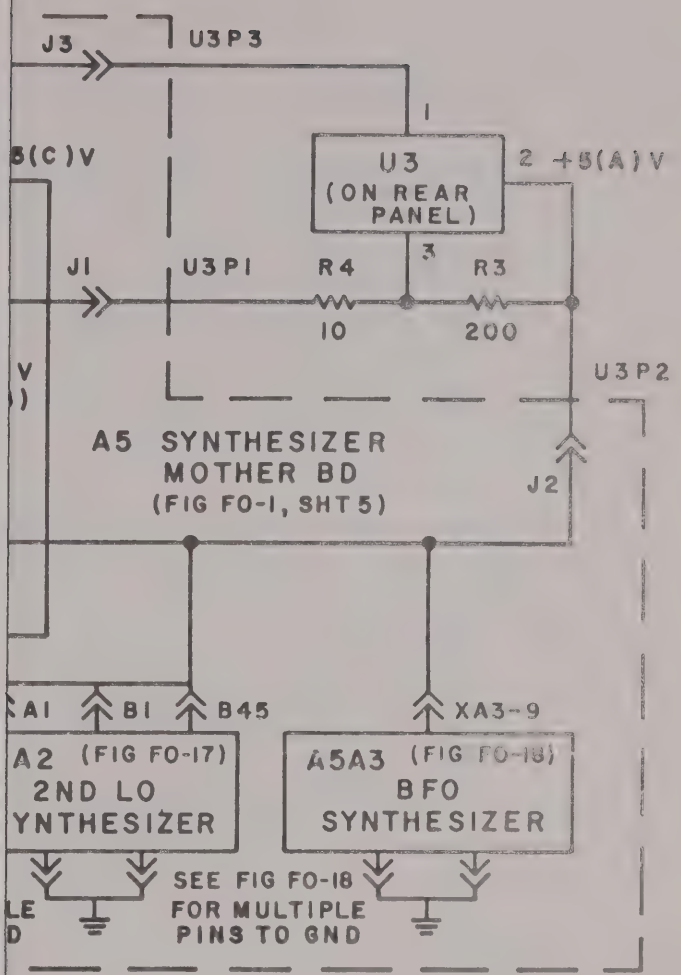


Figure FO-22. Receiver Power Distribution Diagram (Sheet 2 of 3)



FO-22. Receiver Power Distribution Diagram (Sheet 3 of 3)

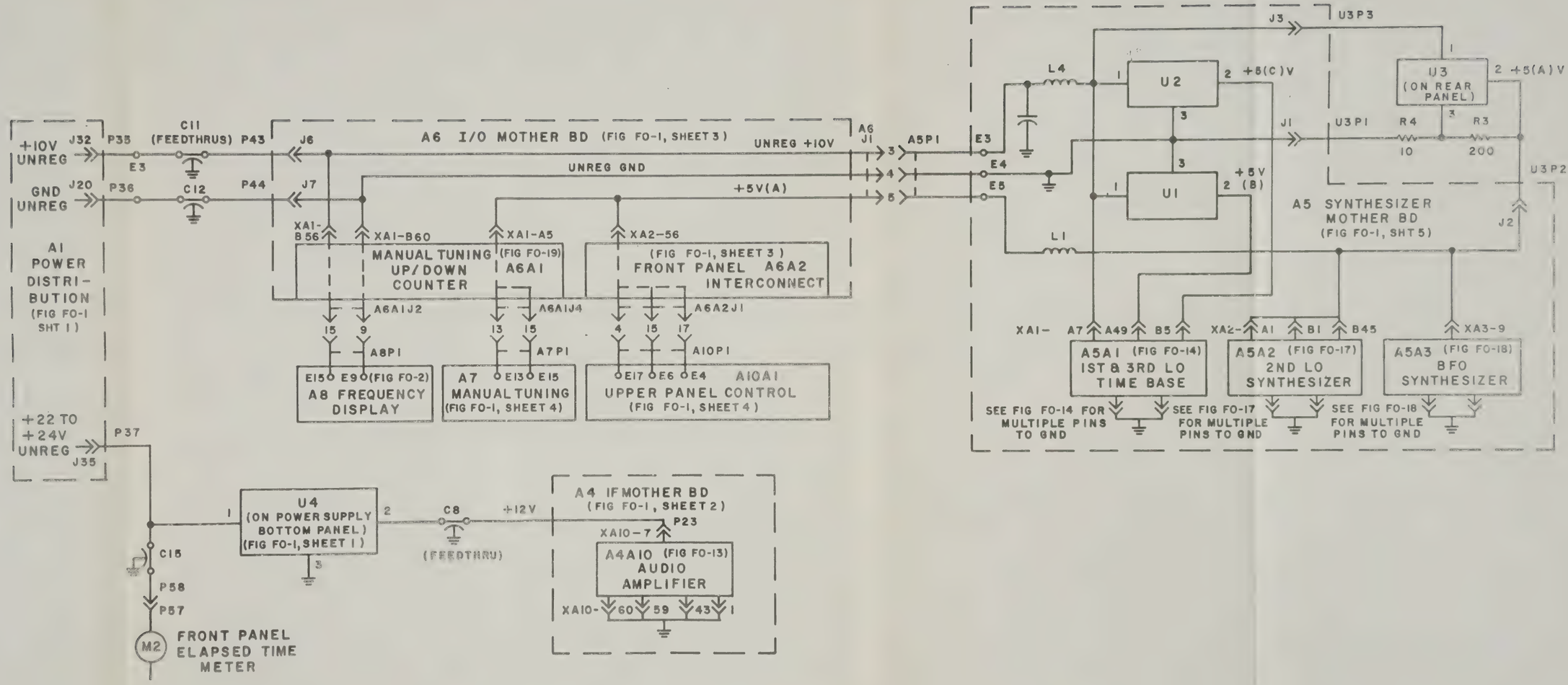


Figure FO-22. Receiver Power Distribution Diagram (Sheet 3 of 3)

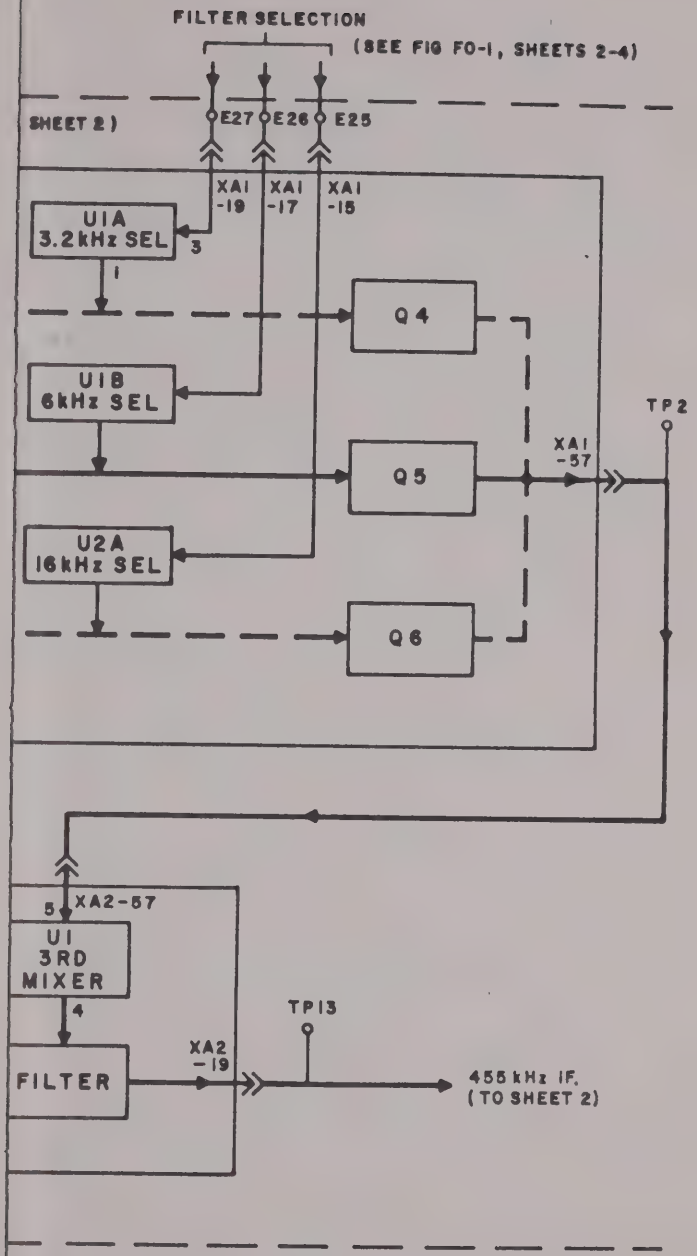


Figure FO-23. Receiver Signal Flow Diagram (Sheet 1 of 3)

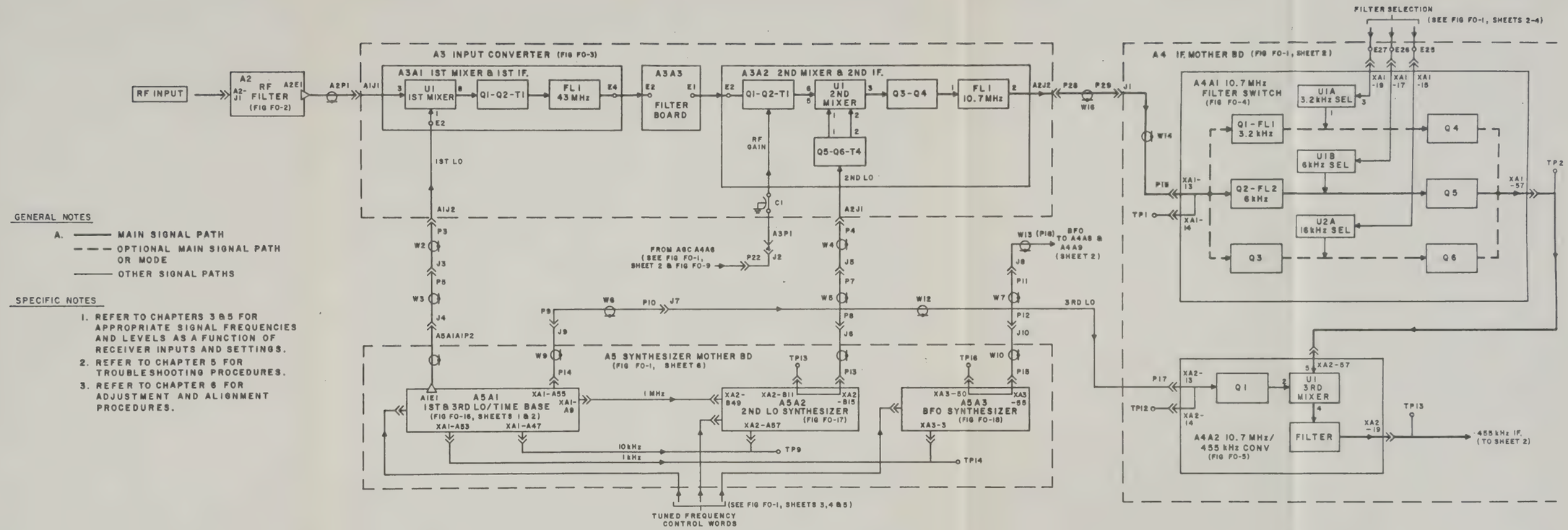

GENERAL NOTES
A. MAIN SIGNAL PATH
OPTIONAL MAIN SIGNAL PATH OR MODE
OTHER SIGNAL PATHS
SPECIFIC NOTES
1. REFER TO CHAPTERS 3 & 5 FOR APPROPRIATE SIGNAL FREQUENCIES AND LEVELS AS A FUNCTION OF RECEIVER INPUTS AND SETTINGS.
2. REFER TO CHAPTER 5 FOR TROUBLESHOOTING PROCEDURES.
3. REFER TO CHAPTER 6 FOR ADJUSTMENT AND ALIGNMENT PROCEDURES.
RF INPUT
A2 RF FILTER (FIG FO-2)
A3 INPUT CONVERTER (FIG FO-3)
A3A1 1ST MIXER & 1ST IF.
U1 1ST MIXER
Q1-Q2-T1
FL1 43 MHz
A3A3 FILTER BOARD
A3A2 2ND MIXER & 2ND IF.
U1 2ND MIXER
Q3-Q4
FL1 10.7 MHz
Q5-Q6-T4
RF GAIN
1ST LO
2ND LO
FROM A6C A4A6 (SEE FIG FO-1, SHEET 2 & FIG FO-9)
A5 SYNTHESIZER MOTHER BD (FIG FO-1, SHEET 6)
A5A1 1ST & 3RD LO/TIME BASE (FIG FO-16, SHEETS 1 & 2)
A5A2 2ND LO SYNTHESIZER (FIG FO-17)
A5A3 BFO SYNTHESIZER (FIG FO-18)
1 MHz
10 kHz
1 kHz
TP9
TP14
TUNED FREQUENCY CONTROL WORDS
(SEE FIG FO-1, SHEETS 3,4 & 5)
FILTER SELECTION (SEE FIG FO-1, SHEETS 2-4)
A4 IF MOTHER BD (FIG FO-1, SHEET 2)
A4A1 10.7 MHz FILTER SWITCH (FIG FO-4)
U1A 3.2 kHz SEL
U1B 6 kHz SEL
U2A 16 kHz SEL
Q1-FL1 3.2 kHz
Q2-FL2 6 kHz
Q3
Q4
Q5
Q6
BFO TO A4A8 & A4A9 (SHEET 2)
3RD LO
A4A2 10.7 MHz/ 455 kHz CONV (FIG FO-5)
U1 3RD MIXER
FILTER
455 kHz IF. (TO SHEET 2)
TP1
TP2
TP12
TP13

Figure FO-23. Receiver Signal Flow Diagram (Sheet 1 of 3)

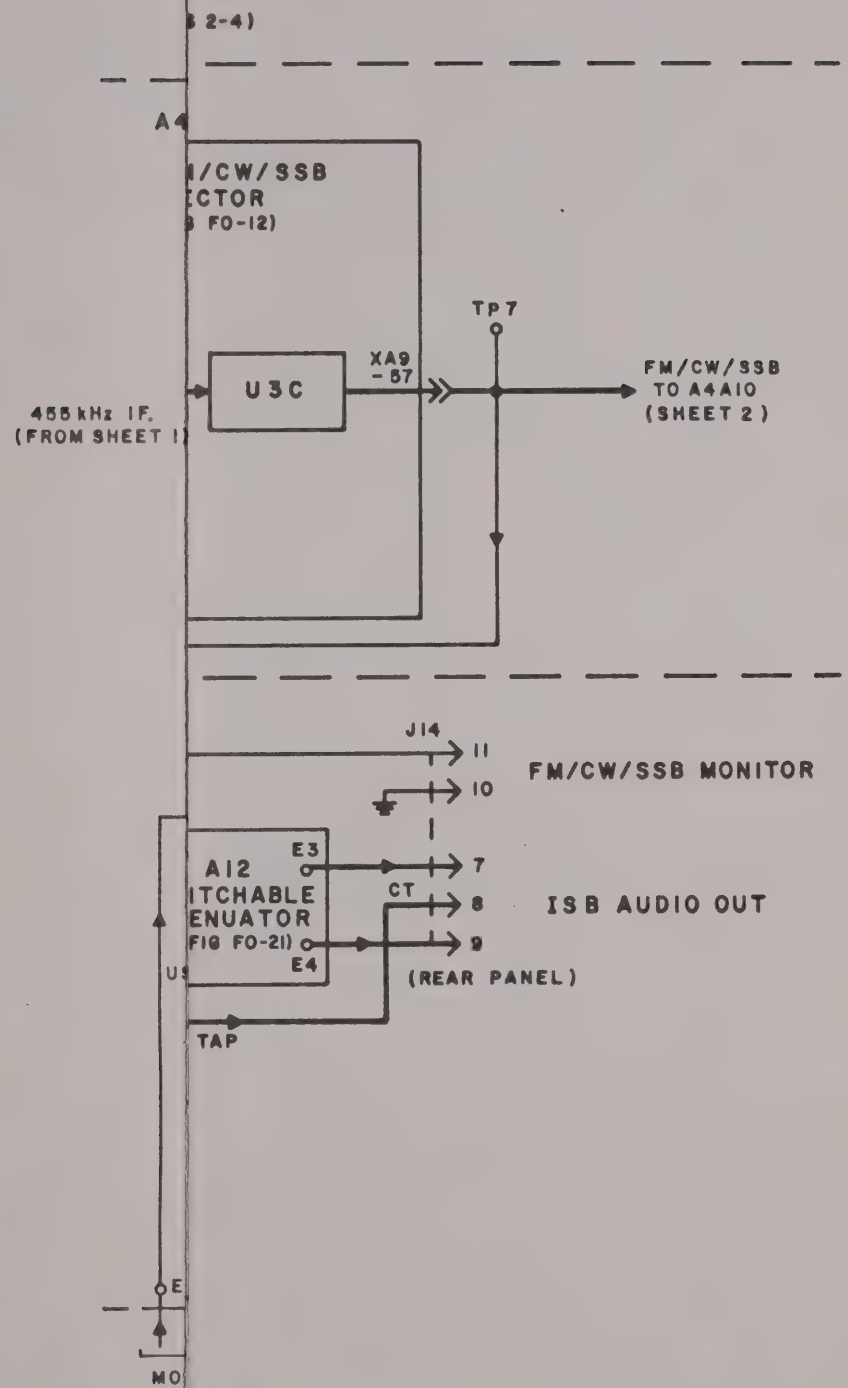


Figure FO-23. Receiver Signal Flow Diagram (Sheet 2 of 3)

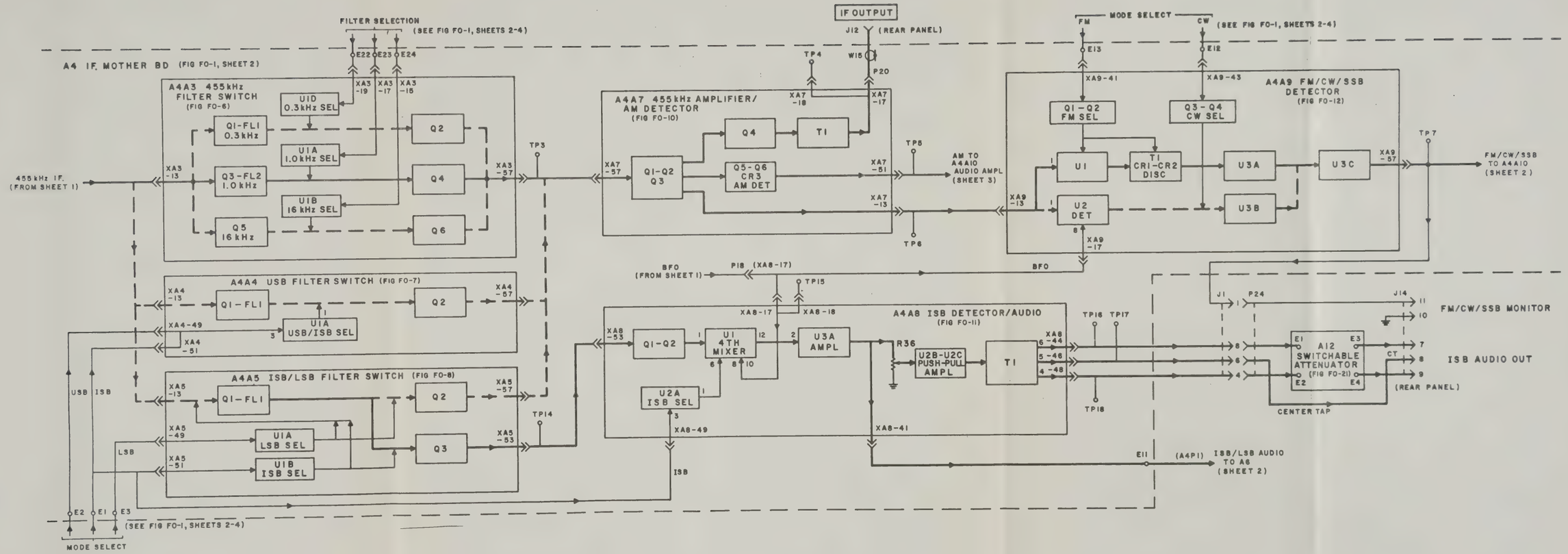


Figure FO-23. Receiver Signal Flow Diagram (Sheet 2 of 3)

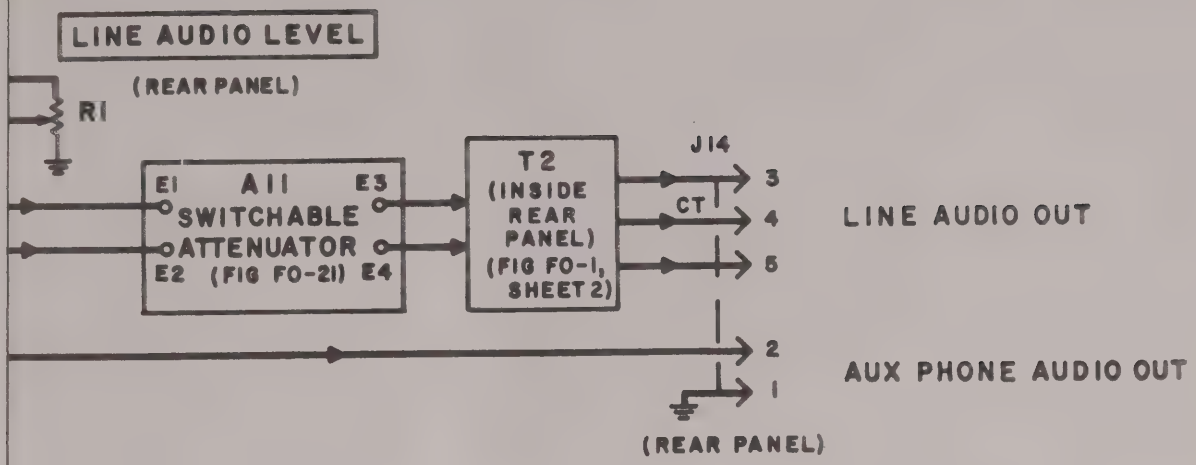


Figure FO-23. Receiver Signal Flow Diagram (Sheet 3 of 3)

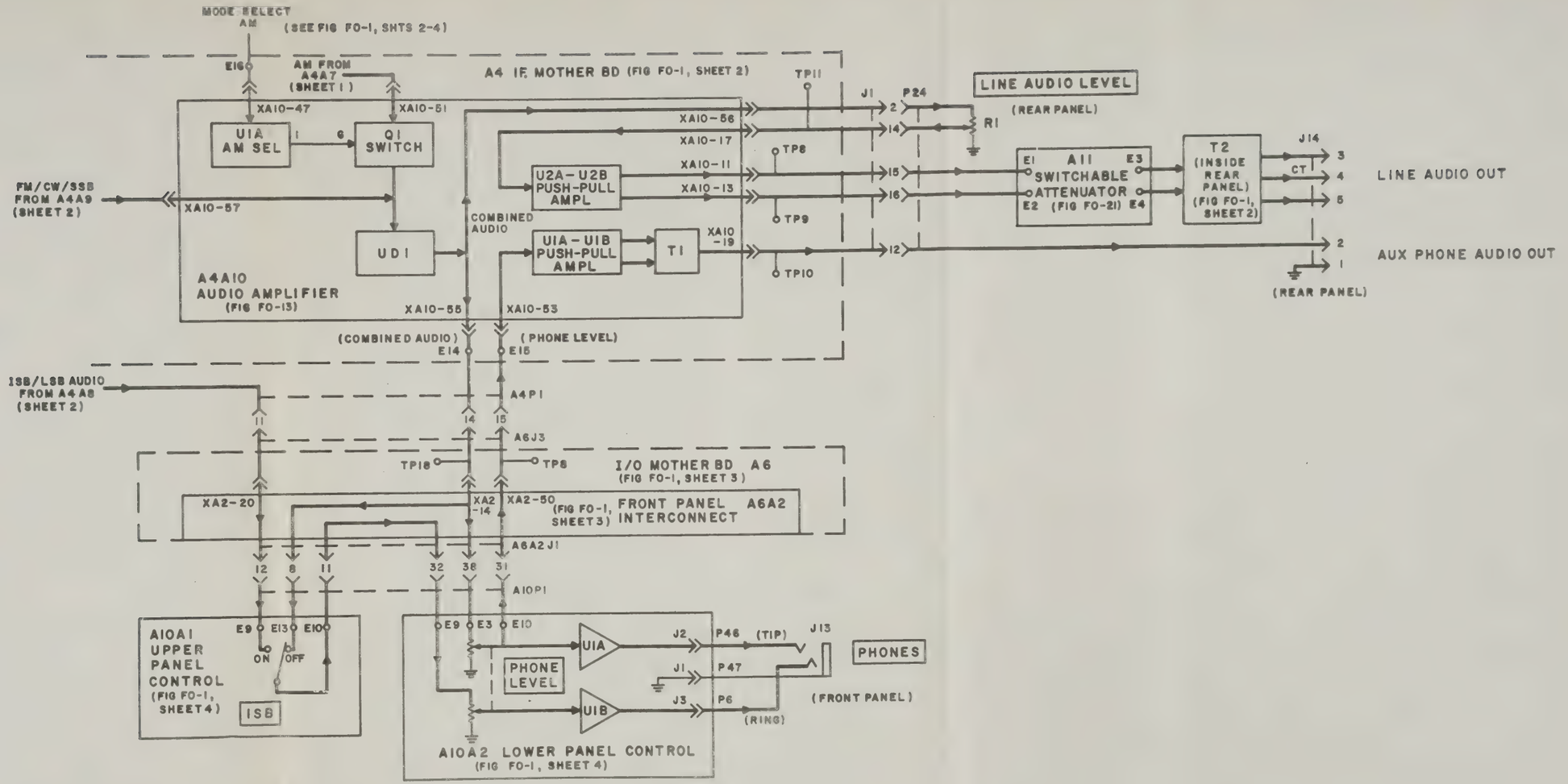


Figure FO-23. Receiver Signal Flow Diagram (Sheet 3 of 3)

CHAPTER 6

CORRECTIVE MAINTENANCE

6-1. INTRODUCTION. This chapter presents the information and procedures required to perform all necessary adjustments, alignments, and component removal and replacement. Section I contains adjustment and alignment procedures; section II contains component removal and replacement procedures that are not obvious, or that present hazards to personnel or equipment. Repair procedures are arranged in numeric-alpha order by equipment unit designation. Refer to the main chassis schematic diagram, figure FO-1, during the following discussion.

SECTION I

ADJUSTMENTS AND ALIGNMENT

6-2. INTRODUCTION. This section contains adjustment and alignment procedures. These procedures should not be performed on a routine basis, but instead, should be used as aids in troubleshooting and post-repair testing.

a. Prealignment Requirements. Before alignment is attempted, the technician should first perform the relevant procedures to determine which module needs alignment. Alignment and adjustment procedures may be used for testing or aligning new and repaired modules.

b. Modules Requiring No Adjustment or Alignment. There are no adjustment or alignment procedures for the following modules:

(1) A1 - power distribution
(2) A6 - i/o motherboard and components
(3) A7 - manual tuning module
(4) A9 - bfo switch
(5) A10 - front panel control
(6) A11-A12 - switchable attenuators
(7) A13 - power input filter

c. Receiver Energizing and Deenergizing Procedures. Chapter 2 contains procedures for energizing and deenergizing the receiver.

6-3. TEST EQUIPMENT AND EXTENDER CARDS. The adjustment and alignment procedures outlined in this chapter require use of various items of test equipment. The items necessary are specified for each procedure. Table 1-3 gives information on the specific types of test equipment required for adjustment, alignment, troubleshooting and maintenance of the receiver. Each receiver is shipped with two extender cards, part numbers 791647-1 and -2. The cards are identical, except that part number 791647-1 has a card puller and an adjustment tool attached. These extender cards allow access to other pc cards for adjustment and/or alignment, as outlined in the following procedures.

6-4. RF FILTER (A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(1) Spectrum Analyzer

(2) Tracking Generator

b. Procedures.

(1) Deenergize receiver.

(2) Connect test equipment as shown in Figure 6-1.

(3) Set the following tracking generator front panel controls as indicated:

(a) FUNCTION - TRACK ANALYZER
(b) RF OUTPUT LEVEL - -10 dBm
(c) MODE - MARKER
(d) RESOLUTION - 1 kHz

(4) Set the following spectrum analyzer front panel controls as indicated:

(a) RANGE - 0-110
(b) BANDWIDTH - 300 kHz
(c) SCANWIDTH - 5 MHz per division
(d) INPUT ATTENUATION - 40 dB
(e) VIDEO FILTER - 10 kHz
(f) SCAN MODE - INT
(g) LOG REF LEVEL - 0 (2dB log)
(h) SCAN TRIGGER - AUTO
(i) SCAN TIME - 5 msec

(5) Energize receiver.

(6) Tune spectrum analyzer to 30.000 MHz with FINE TUNE switch off.

(7) Set the tracking generator MARKER position to 42.905 MHz.

(8) Connect tracking generator rf output to spectrum analyzer rf input.

(9) While observing the spectrum analyzer, adjust LOG REF LEVEL for full scale deflection.

(10) Reconnect test equipment as shown in figure 6-1.

(11) While observing spectrum analyzer, adjust L1 through L5 of A2A1 for maximum amplitude at 30.000 MHz and sharpest roll-off above 30.000 MHz. See figure 6-2 for typical waveform.

(12) Increse tracking generator output 10 dB and spectrum analyzer output 40 dB.

(13) Position marker at 42.905 MHz, while holding rf filter cover on tightly. The response level at this frequency should be down at least 90 dB from that at 30.000 MHz (adjust LOG REF LEVEL).

(14) Deenergize receiver.

(15) Disconnect test equipment.

6-5. INPUT CONVERTER (A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(1) Signal generator
(2) Rf voltmeter
(3) 50-ohm rf probe

b. Procedures.

(1) Deenergize receiver and loosen the two captive screws holding the A3 module to the chassis. Pull the A3 module out and remove its cover.

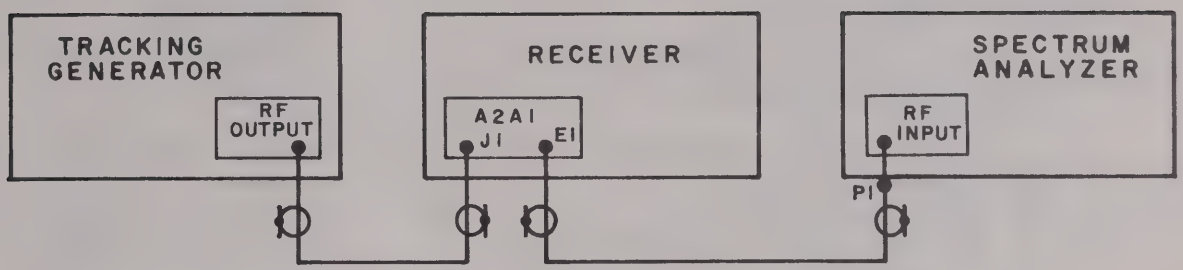


Figure 6-1. RF Filter Alignment, Test Setup

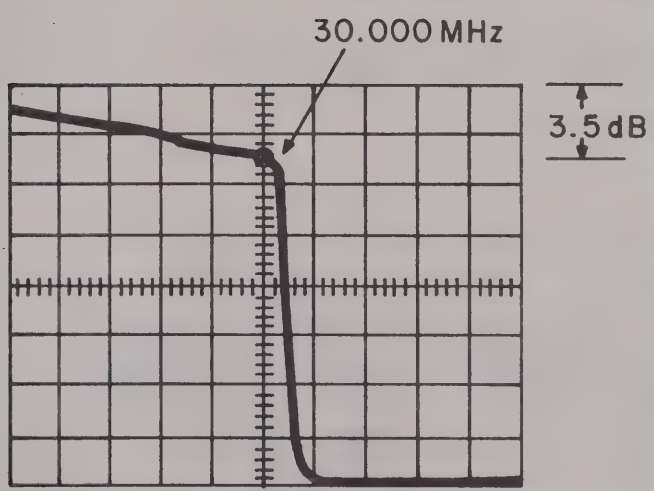


Figure 6-2. RF Filter Alignment, Typical Response

(2) Connect test equipment as shown in figure 6-3.

CAUTION

Exercise caution so that input converter does not short to adjacent power supply circuitry.

(3) Set the following receiver front panel controls as indicated:

(a) METER-SIGNAL STRENGTH
(b) GAIN MODE-MAN
(c) DETECTION MODE-AM
(d) RF GAIN-maximum clockwise
(e) BANDWIDTH kHz-16

NOTE

A yellow indicator will appear in each pushbutton when depressed.

(4) Energize receiver.

(5) Set signal generator to -97 dBm, unmodulated at 15.0050 MHz.

(6) Tune receiver to 15.00500 MHz.

(7) While observing the rf voltmeter, adjust C3 of A3A1 and C1 of A3A2 for maximum meter reading of approximately -15 dBm (40 millivolts). Refer to figure 7-8 and 7-9.

(a) If rf voltmeter indicates less than -17 dBm, remove factory selected resistor A3A1R1 and replace with a 10% higher resistance. Repeat step (6) above.

(b) If rf voltmeter indicates greater than -13 dBm remove factory select resistor A3A1R4 and replace with a 10% lower resistance. Repeat step (6) above.

(8) Tune receiver to 10.81 MHz.

(9) While observing rf voltmeter, adjust C1 of A3C3 for minimum meter reading of 0. Repeat steps (5) through (7) above.

(10) Deenergize receiver.

(11) Disconnect test equipment.

(12) Replace cover on input converter and reinstall it in receiver chassis.

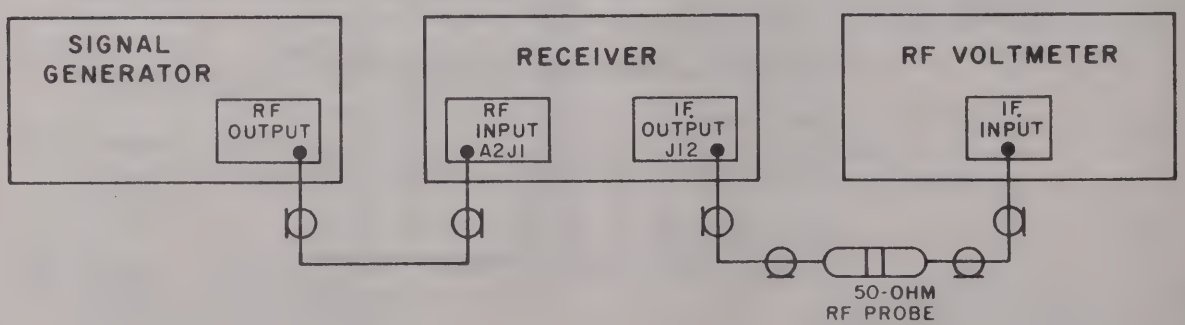


Figure 6-3. Input Converter Alignment, Test Setup

6-6. IF. MOTHERBOARD (A4). This paragraph covers the various items located on the if. motherboard.

a. 10.7 MHz Filter Switch (A4A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Signal generator
(b) Rf voltmeter
(c) VSWR Indicator
(d) Spectrum Analyzer
(e) Tracking Generator

(2) Procedures.

(a) Deenergize receiver.

(b) Set up test equipment as shown in figure 6-4.

(c) Energize receiver.

(d) While observing tracking generator, adjust C32 of A4A1 for minimum VSWR at 10.7 MHz.

(e) Deenergize receiver.

(f) Disconnect test equipment.

(g) Set up test equipment as shown in figure 6-5.

(h) Disconnect P28, the 10.7 MHz input to the if. strip (at jack A2J2 of the input converter).

(i) Feed 10.7 MHz unmodulated signal at -50 dBm level into P28 or the TP1 input of if. motherboard as shown in figure 6-5.

(j) Remove cards A4A1 and A4A2.

NOTE

A4A2 is removed to eliminate loading.

(k) Place A4A1 on extender card.

(l) Energize receiver.

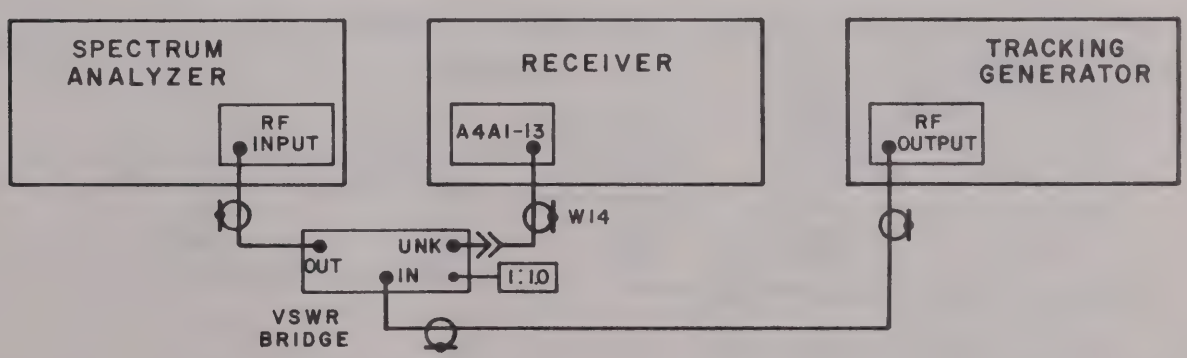


Figure 6-4. 10.7 MHz Filter Switch VSWR Adjustment, Test Setup

(m) Connect input of rf voltmeter, terminated in 50 ohms, to TP2.

(n) Depress IF BANDWIDTH kHz-3.2 button and adjust R26 for -36 dBm voltmeter reading. Refer to figure 7-12.

(o) Depress IF BANDWIDTH kHz-6 button and adjust R28 for -36 dBm voltmeter reading. Refer to figure 7-12.

(p) Depress IF BANDWIDTH kHz -16 button and adjust R30 for -36 dBm voltmeter reading. Refer to figure 7-12.

(q) Deenergize receiver.

(r) Disconnect test equipment.

(s) Reinstall cards A4A1 and A4A2 into proper slots.

b. 455 kHz Amplifier/Am. Detector (A4A7), Response Alignment.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Signal generator
(b) Oscilloscope
(c) Sweep generator
(d) 2:1 summer

(2) Procedures.

(a) Deneergize receiver.

(b) Remove cards A4A3, A4A7 and A4A10.

(c) Place card A4A7 on extender card.

(d) Connect test equipment as shown in figure 6-6.

(e) Set up sweep generator as follows:

1 Power-ON
2 CW/Sweep-SYM
3 TRIG/LINE/FREE-LINE
4 FAST/SLOW/MANUAL-FAST

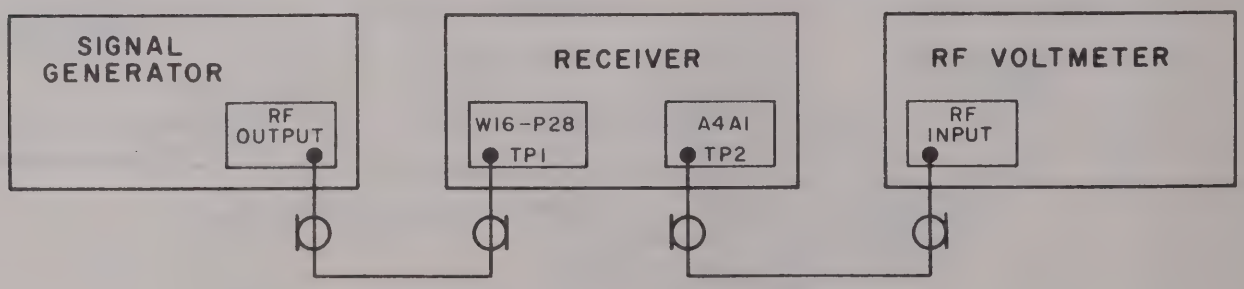


Figure 6-5. 10.7 MHz Filter Switch Gain Adjustment, Test Setup

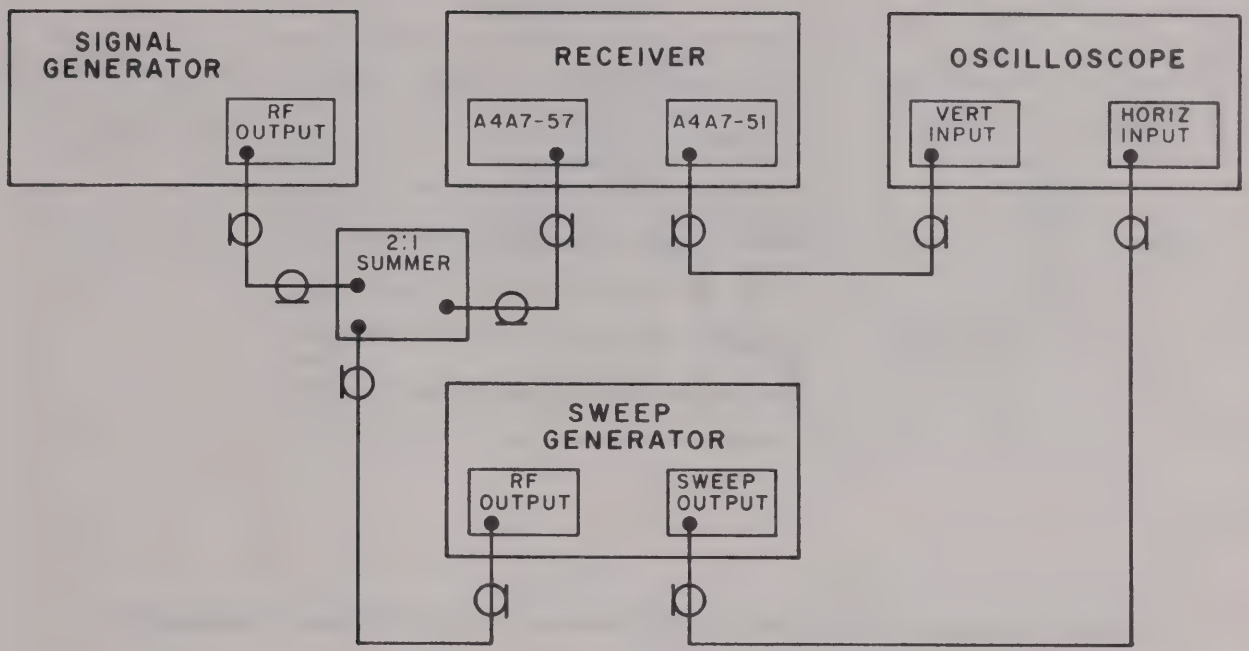


Figure 6-6. 455 kHz Amplifier/Am. Detector Response Alignment, Test Setup

5 Crystal Cal-OFF
6 Range-11
7 Sym Sweep width Vernier-.1/1
8 1 kHz MOD-OFF
9 Output Level- -60 dBm
10 Frequency-455 kHz

(f) Set up signal generator for a 455 kHz output, unmodulated, at -80 dBm.

(g) Set following receiver front panel controls as indicated:

1 GAIN MODE-MAN
2 RF GAIN-maximum clockwise

NOTE

A yellow indicator will appear in the pushbutton when depressed.

(h) Energize receiver.

(i) Adjust sweep generator frequency control to center the response pattern on the oscilloscope screen.

(j) Adjust A4A7L2 and A4A7L3 for an oscilloscope waveform which has maximum amplitude and is symmetrical about the marker. See figure 6-7 for typical waveform.

(k) Deenergize receiver.

(l) Disconnect test equipment.

(m) Reinstall cards A4A3, A4A7 and A4A10 into their proper slots.

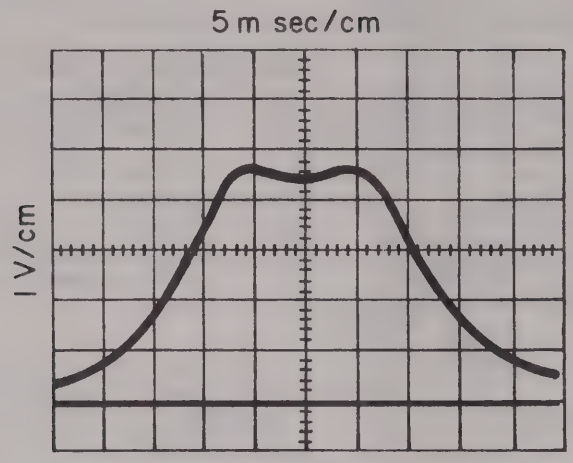


Figure 6-7. 455 kHz Amplifier/Am. Detector Typical Response

c. 455 kHz Amplifier/Am. Detector (A4A7), Gain Adjustment.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Signal generator
(b) Rf voltmeter
(c) 50-ohm rf probe

(2) Procedures.

(a) Deenergize receiver.

(b) Connect test equipment as shown in figure 6-8.

(c) Set following receiver front panel controls as indicated:

1 METER-SIGNAL STRENGTH
2 GAIN MODE-MAN
3 DETECTION MODE-AM
4 RF GAIN-maximum clockwise
5 IF BANDWIDTH kHz-6

NOTE

A yellow indicator will appear in each pushbutton when depressed.

(d) Energize receiver.

(e) Set rf voltmeter to the 100 millivolts scale.

(f) Set signal generator to 15.0050 MHz, unmodulated at -97 dBm (3 microvolts).

(g) Tune receiver to 15.00500 MHz.

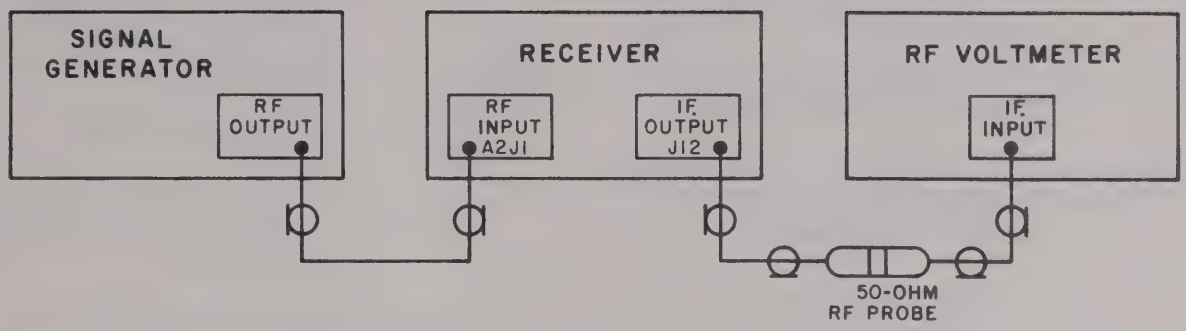


Figure 6-8. 455 kHz Amplifier, Am. Detector Gain Adjustment, Test Setup

(h) Adjust A4A7R7 for 40 millivolts reading on the rf voltmeter. Refer to figure 7-18.

(i) Deenergize receiver.

(j) Disconnect test equipment.

d. Usb and Isb/Lsb Filter Switches (A4A4 and A4A5). This adjustment is used to equalize the output levels of A4A4 and A4A5.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A signal generator will be required for this test. Refer to table 1-3 for specifics.

(2) Procedures.

(a) Deenergize receiver.

(b) Connect rf output of signal generator to RF INPUT connector A2J1. Refer to figure 6-9.

(c) Put card A4A4 on an extender card.

(d) Set following receiver front panel controls as indicated:

1 METER-SIGNAL STRENGTH
2 GAIN MODE-MAN
3 DETECTION MODE-AM
4 RF GAIN-maximum clockwise
5 PHONE LEVEL-at the midpoint
6 IF BANDWIDTH kHz-16

NOTE

A yellow indicator will appear in each pushbutton when depressed.

(e) Energize receiver.

(f) Tune receiver to 15.00500 MHz.

(g) Set signal generator to a 5.0050 MHz unmodulated signal.

(h) Adjust signal generator output level until the signal strength meter reads the SET level.

(i) Change signal generator frequency to 15.0054 MHz.

(j) Select usb detection mode by depressing DETECTION MODE-USB pushbutton.

(k) Adjust potentiometer A4A4R23 until the meter reads SET level or until R23 is at maximum setting, whichever occurs first. Refer to figure 7-14.

(l) Record meter level.

(m) Deenergize receiver. Replace card A4A4 in proper slot. Put card A4A5 on extender card.

(n) Energize receiver. Change signal generator frequency to 15.0046 MHz.

(o) Select lsb detection mode by depressing DETECTION MODE-LSB pushbutton.

(p) Adjust potentiometer A4A5R32 until meter reads the level obtained in step (k). If step (k) level cannot be obtained, set A4A5R32 at maximum setting, record the meter reading, and perform steps (q) through (v). Refer to figure 7-16.

(q) Deenergize receiver.

(r) Replace A4A5 in proper slot and put A4A4 on extender card.

(s) Energize receiver. Change signal generator frequency to 15.0054 MHz.

(t) Select usb detection mode by depressing DETECTION MODE-USB pushbutton.

(u) Adjust potentiometer A4A4R23 until meter reads the level obtained in step (p). Refer to figure 7-16.

(v) Deenergize receiver.

(w) Disconnect test equipment. Replace A4A4, A4A5 in their proper slots.

e. ISB Detector/Audio (A4A8).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Signal generator
(b) Oscilloscope
(c) Stereo phone plug
(d) BNC TEE
(e) 600-ohm, 1/2 W terminator

(2) Procedures.

(a) Deenergize receiver.

(b) Connect test equipment as shown in figure 6-9.

(c) Set following receiver front panel controls as indicated:

1 GAIN MODE-MAN
2 DETECTION MODE-ISB
3 RF GAIN-maximum clockwise
4 PHONE LEVEL-maximum clockwise.

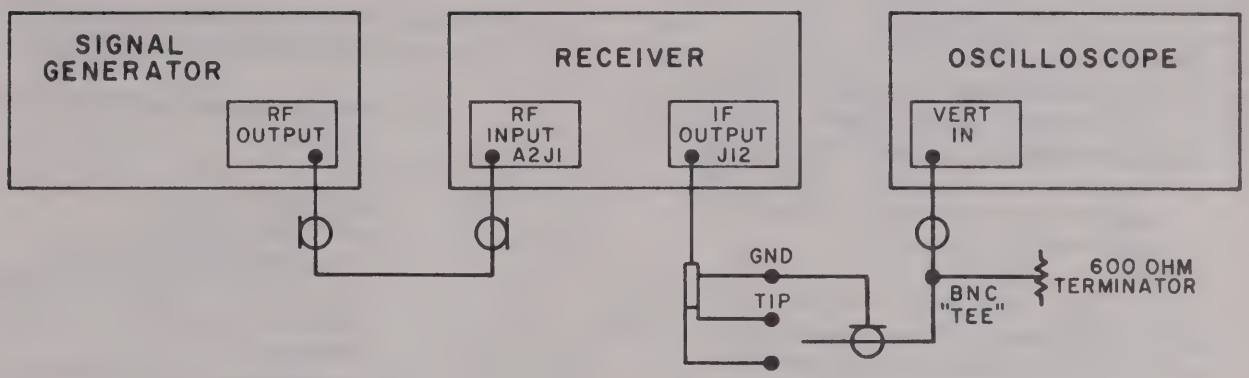


Figure 6-9. Isb Detector/Audio Adjustment, Test Setup

NOTE

A yellow indicator will appear in each pushbutton when depressed.

(d) Energize receiver.

(e) Set signal generator to -105 dBm, unmodulated signal, at 15.0054 MHz.

(f) Tune receiver to 15.00500 MHz.

(g) With equipment connected properly, a 400 Hz audio output of appx. 26 V p-p should be seen on oscilloscope.

(h) Adjust PHONE LEVEL gain control on front panel for maximum amplitude on the oscilloscope, without clipping or distortion present. Record this reading. This is the upper sideband signal.

(i) Change signal generator frequency to 15.0046 MHz.

(j) Connect oscilloscope to ring on phone jack. This is the lower sideband signal.

(k) Adjust A4A8R8 to obtain the same output obtained in step (h) above, or until output is at maximum. Refer to figure 7-19.

(l) If same level as in step (h) cannot be obtained, change factory select resistor R18 and repeat steps (c) through (k). Refer to figure 7-19.

NOTE

Increasing resistance of R18 increases the lsb level. Decreasing resistance of R18 decreases lsb level. The resistance of R18 should be greater than 1 kilohm and less than 8.2 kilohms. Use a 1/4 watt, 5% tolerance resistor.

(m) Deenergize receiver.

(n) Disconnect test equipment.

f. FM Discriminator (A4A9).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Signal generator
(b) Sweep generator
(c) Oscilloscope
(d) 2:1 summer

(2) Procedures.

(a) Deenergize receiver.

(b) Remove cards A4A7, A4A9 and A4A10.

(c) Place card A4A9 on extender card.

(d) Connect test equipment as shown in figure 6-10.

(e) Set up sweep generator as follows:

1. Power-ON
2. CW/Sweep-SYM
3. TRIG/LINE/FREE-LINE
4. FAST/SLOW/MANUAL-FAST
5. Crystal Cal-OFF
6. Range-11
7. Sym Sweep Width Vernier-.1/1
8. 1 kHz Mod-OFF
9. Output Level- -10 dBm
10. Frequency-455 kHz

(f) Set up signal generator for a 455 kHz output, unmodulated, at -25 dBm.

(g) Select fm detection mode by depressing DETECTION MODE-FM pushbutton.

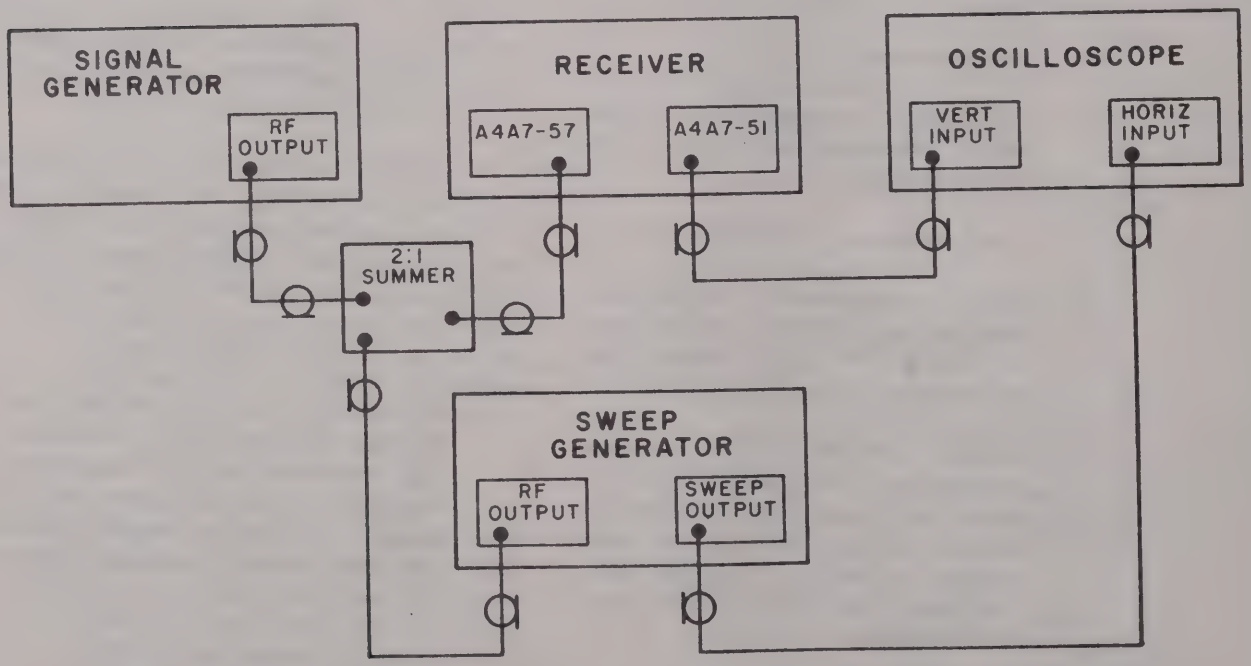


Figure 6-10. Fm Discriminator Alignment, Test Setup

NOTE

A yellow indicator will appear in each pushbutton when depressed.

(h) Energize receiver.

(i) Adjust sweep generator frequency control to center the response pattern on the oscilloscope screen.

(j) Adjust A4A9L1 and A4A9T1 for an oscilloscope waveform which has maximum amplitude and is symmetrical and linear about the marker. See figure 6-11 for typical waveform. Refer to figure 7-20.

(k) Deenergize receiver.

(l) Disconnect test equipment.

(m) Reinstall cards A4A7, A4A9 and A4A10 into their proper slots.

6-7. SYNTHESIZER MOTHERBOARD (A5). This paragraph covers the various items located on the synthesizer motherboard.

a. 1st Lo Synthesizer (A5A1). The only alignment points for the 1st lo synthesizer are in the 1st lo voltage controlled oscillator (A5A1A1) which is a very sensitive circuit. Care must be taken to ensure proper operation. This procedure should be performed only when a definite alignment is needed.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is needed to complete this test. Refer to table 1-3 for specifics.

(2) Procedures.

(a) Deenergize receiver.

(b) Mount 1st and 3rd lo synthesizers card extender cards.

(c) Remove vco front plate.

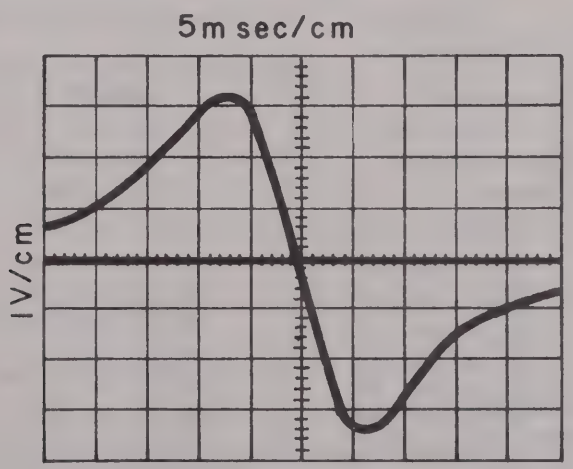


Figure 6-11. Fm Discriminator Alignment, Typical Waveform

(d) Connect digital voltmeter to module pin B1.

(e) Energize receiver.

(f) Align vco from band 0 to 7. Table 6-1 lists the components and their parameters used in this alignment.

NOTE

Alignment of vco bands 1 through 7 cannot be accomplished unless the band 0 voltage limits are adjusted to within the range listed in table 6-1. If the band 0 limits cannot be properly adjusted change factory select capacitor C6. Refer to paragraph 6-7g and table 6-4.

(g) Align each vco band monitoring voltage at module pin B1.

(h) Check the 1st lo frequency band (test point E3 in the vco) while dialing the tuned frequency in 10 kHz steps starting with 00.00000 MHz.

(i) Deenergize receiver.

(j) Disconnect voltmeter, replace vco front plate and replace 1st and 3rd lo synthesizer card in proper slots.

b. 2nd Lo Synthesizer (A5A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test. Refer to table 1-3 for specifics.

(a) Digital voltmeter
(b) Frequency counter

(2) Procedures. This procedure consists of a 32 MHz loop alignment, a programmable loop alignment, and an output loop alignment. Perform the procedure in the given sequence. Refer to figure 7-27.

Table 6-1. Vco Alignment Parameters

Vco band	1st lo freq band (MHz)	Voltage pin B1 (typical)	Alignment component
0	42.91-46.90	-8.5 to 6.0	C6*, L1
1	46.91-50.90	-7.5 to 4.1	L2
2	50.91-54.90	-7.2 to 2.8	L3
3	54.91-54.90	-5.3 to 3.9	L2, L3
4	58.91-62.90	-6.6 to 2.7	L4
5	62.91-66.90	-6.0 to 2.2	L4, L2
6	66.91-70.90	-6.2 to 0.4	L3, L4
7	70.91-72.90	-5.7 to-3.0	L4, L3, L2

* Factory select value. (Refer to paragraph 6-7g.)

NOTE

For optimum results, 2nd lo synthesizer alignment should be performed in an ambient temperature of +25° C ±5° C (+77° F ±9° F).

(a) Deenergize receiver.

(b) Mount 2nd lo synthesizer card on extender card.

(c) Energize receiver. Allow 30 minutes for warm-up of equipment.

(d) Using digital voltmeter, verify that +15 Vdc ±0.75 Vdc is present at pins B5, B41, and A59, and that +5 Vdc ±0.25 Vdc is present at pins A1, B1, and B45.

(e) Using frequency counter, verify that 1 MHz reference frequency at pin B49 is 1.000000 MHz and that 10 kHz reference frequency at pin A57 is 10.000 kHz.

NOTE

If the two reference frequencies are not correct, perform the time base adjustment procedure before proceeding with the 2nd lo synthesizer alignment. Refer to paragraph 6-7e.

(f) 32 MHz loop vco alignment.

1 Connect digital voltmeter to test point E1.

2 Adjust capacitor C51 until voltmeter reading of +3.0 Vdc is observed with alignment tool withdrawn from vco shield.

(g) Programmable loop vco alignment.

1 Connect digital voltmeter to test point E3.

2 Tune receiver to 00.00499 MHz.

3 Insert alignment tool in the vco shield opening and spread or squeeze turns of L8 until voltmeter reading of +4.0 Vdc is observed with alignment tool withdrawn from vco shield.

(h) Output loop vco alignment.

1 Connect digital voltmeter to test point E2.

2 Tune receiver to 00.00499 MHz.

3 Adjust capacitor C61 until voltmeter reading of +3.0 Vdc is observed with alignment tool withdrawn from vco shield.

4 Using frequency counter, verify that 32.205010 MHz ±3 Hz is present at output pin B15.

(i) Final adjustments.

1 Deenergize receiver.

2 Remove 2nd lo synthesizer board from extender card and return it to receiver.

3 Mount top protective cover on receiver (use only four fasteners to secure top cover).

4 Energize receiver and allow it to operate for minimum of 30 minutes.

5 Tune receiver to 00.00499 MHz.

6 With receiver in operation, remove bottom protective cover.

7 Using digital voltmeter, check loop test point voltages as indicated in table 6-2.

NOTE

Test point voltages may drift from initial settings. If any test point voltage is not within tolerance, repeat the appropriate loop alignment procedure. Set the test point voltage(s) high or low as required to compensate for any drift observed in step 7. Do not proceed to step 8 until the voltages in table 6-2 are observed after the receiver has been in operation for 30 minutes with both covers in place.

8 Using frequency counter, verify that 32.2005010 MHz ±3 Hz is present at pin A5XA2-B15.

9 Tune receiver first to 00.00000 MHz and then to 00.00999 MHz. Appropriate loop test point voltages and the 2nd lo output frequencies are given in table 6-3.

10 Remount top protective cover on receiver.

c. 2nd Lo Filter (1L1/1C13).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. An rf voltmeter and a 50-ohm adapter are required for this test. Refer to table 1-3 for specifics.

Table 6-2. Loop Test Point Voltages

Parameter	Pin number	Test point voltage
32 MHz loop TP	A5XA2-B57	+3 Vdc ±0.1 Vdc
Programmable loop TP	A5XA2-A51	+4 Vdc ±0.1 Vdc
Output loop TP	A5XA2-A55	+3 Vdc ±0.1 Vdc

Table 6-3. 2nd Lo Synthesizer Tuning Parameters

Parameter	Pin number	Receiver tuned frequency	
		00.00000 MHz	00.00999 MHz
32 MHz loop TP	A5XA2-B57	+3 Vdc ±0.2 Vdc	+3 Vdc ±0.2 Vdc
Programmable loop TP	A5XA2-A51	>1.5 Vdc	< 7.0 Vdc
Output loop TP	A5XA2-A55	+3 Vdc ±0.2 Vdc	+3 Vdc ±0.2 Vdc
2nd LO frequency	A5XA2-B15	32.21000 MHz	32.20010 MHz

(2) Procedures.

(a) Deenergize receiver.

(b) Disconnect connector P4 from A2J1 of input converter (A3).

(c) Connect rf voltmeter and 50-ohm adapter to P4.

(d) Set voltmeter to 0 dBm (.3 millivolts) scale and energize the receiver.

(e) Adjust 1C13 for maximum voltmeter reading.

NOTE

Access to 1C13 requires removal of the bottom protective cover. Refer to figure 7-2.

(f) Deenergize receiver. Disconnect voltmeter and reconnect P4.

d. 3rd Lo Synthesizer (A5A1A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is required for this test. Refer to table 1-3 for specifics.

(2) Procedures.

(a) Deenergize receiver.

(b) Mount 1st and 3rd lo synthesizer on extender cards

(c) Connect digital voltmeter to pin 8 of U22. Refer to figure 7-26.

(d) Energize receiver. Adjust capacitor C33 until reading of 3.0 Vdc is seen on voltmeter. Refer to figure 7-26.

(e) Deenergize receiver and disconnect digital voltmeter.

e. 2 MHz Time Base (A5A1A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital counter is required for this test. Refer to table 1-3 for specifics.

(2) Procedures.

NOTE

Before performing the following adjustment, the receiver should have been in operation for at least one hour at normal operation temperature to allow the circuit to stabilize.

(a) Deenergize receiver.

(b) Mount 1st and 3rd lo synthesizer (A5A1A2) on extender cards.

(c) Connect digital counter to rear panel 1 MHz REF connector J11.

(d) Set rear panel S2 CLOCK switch to INT position.

(e) Energize receiver. Allow at least a 5 minute warm-up to stabilize the circuits. (This assumes power was not off

more than 5 minutes to make cable connections.)

(f) While observing counter display, adjust 2 MHz crystal oscillator (U14) for reading of 1.000000 MHz ±3 Hz. Refer to figure 7-26.

(g) Deenergize receiver and disconnect digital counter.

(h) Replace card A5A1A2 into proper slot.

f. Bfo Synthesizer (A5A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is required for this test. Refer to table 1-3 for specifics.

(2) Procedures. Two alignments are required for the bfo synthesizer. Capacitor C8 and resistor R1 are interdependent and must be aligned simultaneously. Refer to figure 7-28.

(a) Deenergize receiver.

(b) Mount bfo synthesizer card on extender cards.

(c) Connect digital voltmeter between module pin 7 and ground.

(d) Energize receiver. Adjust C8 until approximately 3.0 Vdc is seen at module pin 7.

(e) Connect digital voltmeter between pins 3 and 2 of Q4.

(f) Adjust R1 until gate to source voltage of Q4 (Pins 3 and 2) is 0 Vdc. (The voltage from gate to ground and from source to ground will be approximately 1.2 Vdc.)

(g) Adjust C8 again until 3.0 Vdc is seen at module pin 7.

(h) Deenergize receiver. Disconnect voltmeter.

(i) Replace card A5A3 in proper slot.

g. Factory Select Synthesizer Components. The values of the components listed in table 6-4 are selected during synthesizer alignment at the factory to optimize synthesizer performance. The components should be changed only when corrective maintenance to a synthesizer loop causes the tuning voltage range for that loop to be less than or greater than the voltages listed in tables 6-1 through 6-3. If the voltage range is more negative than the voltage listed the capacitance must be increased. If the voltage range is more positive than the voltage listed the capacitance must be decreased.

6-8. FREQUENCY DISPLAY (A8). The intensity of the front panel LED display may be varied. No test equipment is required.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

To vary the intensity, adjust potentiometer R2, located inside the front panel on the left side of the frequency display. Turning R2 clockwise increases intensity. Refer to figure 7-34.

Table 6-4. Factory Selected Synthesizer Components

Loop	Module	Component	Recommended range, tolerance & voltage rating
1st lo loop	1st lo vco (1A5A1A1A1)	C6	3.3 to 6.8 pF, ±.05 pF, 500 V
3rd lo loop	1st/3rd lo timebase (1A5A1A2)	C43	10 to 18 pF, 5%, 500 V
32 MHz loop (2nd lo)	2nd lo synthesizer (1A5A2)	C57	4.7 to 6.8 pF, ±.05 pF, 500 V
Output loop (2nd lo)	2nd lo synthesizer (1A5A2)	C66	2.7 to 6.8 pF, ±.25 pF, 500 V
na	2nd mixer/2nd if. (1A3A2)	R3	10 ohms, 5%, .25 W
na	1st mixer/1st if. (1A3A1)	R4	150 ohms, 5%, .125 W
na	1st & 3rd lo synthesizer/time base (1A5A1A2)	R6	6.8 K ohms, 5%, .25 W
na	1st & 3rd lo synthesizer/time base (1A5A1A2)	R7	5.6 K ohms, 5%, .25 W
na	1st & 3rd lo synthesizer/time base (1A5A1A2)	R8	100 K ohms, 5%, .25 W
na	isb detector/audio (1A4A8)	R18	2.2 K ohms, 5%, .25 W
na	agc amplifier (1A4A6)	R46	39 K ohms, 5%, .25 W
na	agc amplifier (1A4A6)	R50	3.9 K ohms, 5%, .25 W
na	agc amplifier (1A4A6)	R51	390 ohms, 5%, .25 W

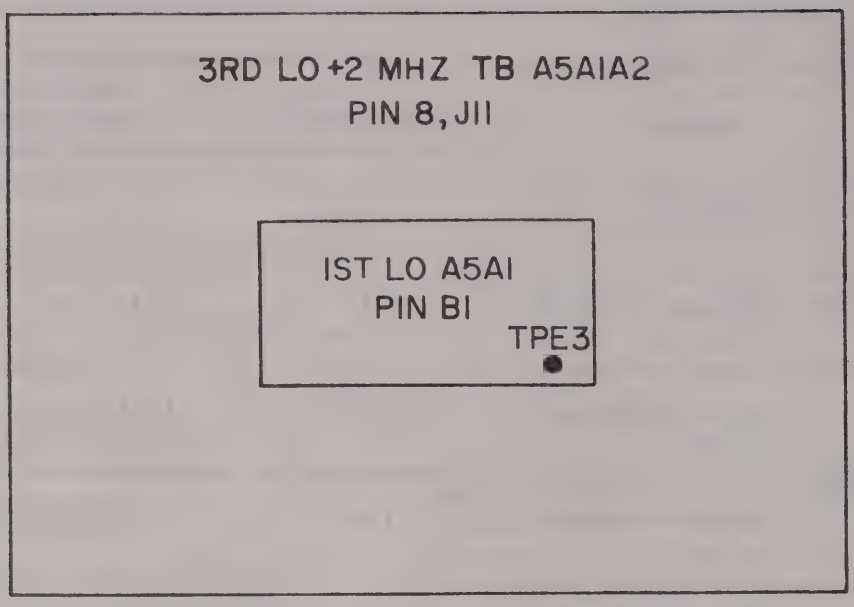


Figure 6-12. 1st/3rd Lo Synthesizer and 2 MHz Time Base Alignment, Test Setup

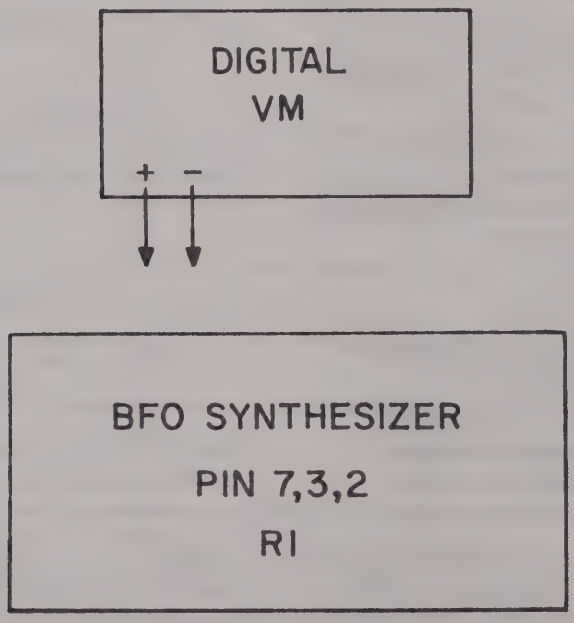


Figure 6-13. Bfo Synthesizer Alignment, Test Setup

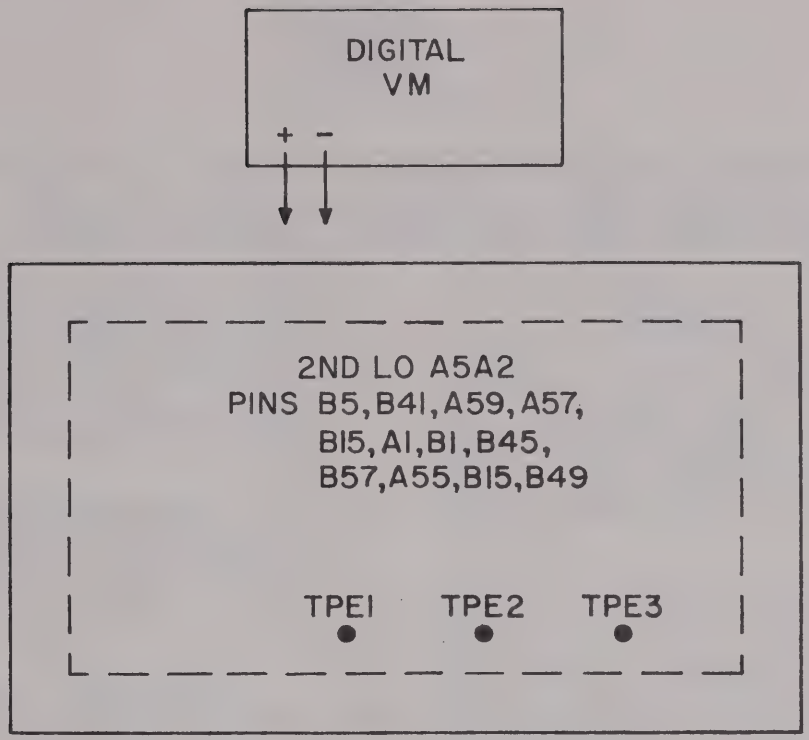


Figure 6-14. 2nd Lo Synthesizer Alignment, Test Setup

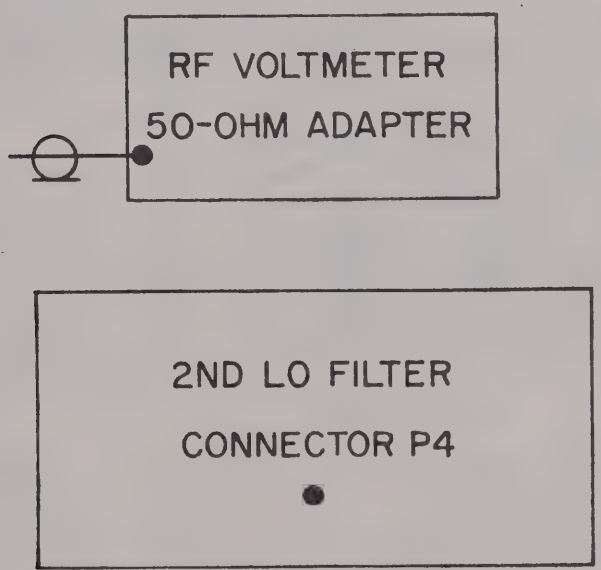


Figure 6-15. 2nd Lo Filter Alignment, Test Setup

SECTION II

REPAIR

6-9. INTRODUCTION. This section contains removal and repair procedures that are not obvious or that present hazards to personnel or equipment.

WARNING

To prevent electrical shock or damage, always disconnect the receiver from the power source before removing modules or when soldering or replacing components.

6-10. ACCESS. All modules are readily accessible. Refer to chapter 7 for location of modules and components. Modules and components on the front panel are exposed by removing the three screws on each end of the front panel (under the handles) and tilting the front panel forward. Reinstallation of front panel is the reverse of the removal procedure.

6-11. SOLDERING TECHNIQUES. When removing components from a printed circuit card for inspection or replacement, be careful not to damage the foil. The soldering iron power should be no greater than 40 W, and a solder sipper or wicking procedure should be employed when removing solder. Noncorrosive soldering flux should be used when removing solder by wicking. In returning components to the card, make sure that holes are clear and that leads do not catch the edge of the foil and lift it from the card. A good grade of rosin core 60/40 solder should be used. Heat no longer than is necessary to achieve a good joint. A heat sink should be used where possible.

6-12. COMPONENT REPLACEMENT. When any electronic part is removed, note the position of the part and its leads, and replace it the same way. Specific guidelines for replacing the various kinds of components are as follows:

a. Diodes and Resistors. When soldering or unsoldering diodes or resistors, solder quickly to allow as little heat conduction as possible. When wiring permits, use a heat sink between the soldering iron and the part.

b. Transistors. When soldering or unsoldering transistors, use a low wattage iron and a heat sink. Solder as quickly as possible. The use of a circular soldering tip to heat all three or four joints simultaneously is recommended.

c. Capacitors. When soldering or unsoldering glass or ceramic capacitors, use a heat sink between the capacitors and the iron. Excessive heat will crack the capacitor body.

6-13. REALIGNMENT. Replacement of semiconductors or tuned circuit components may affect the alignment of the pc card being repaired. Realignment may be necessary to return the pc card to normal operation. Refer to section I of this chapter for the appropriate procedures.

CHAPTER 7

PARTS LIST

7-1. INTRODUCTION. This chapter contains a list of electrical parts and attaching hardware for Radio Receiving Set AN/URR-74(V)2. The contents are broken down into six basic parts. These consist of the list of common item descriptions, list of attaching hardware, list of manufacturers, and parts location illustrations.

a. List of Major Units. Table 7-1, List of Major Units, lists the major unit and its page number in the parts list and where the breakdown for that assembly begins.

b. Parts List. Table 7-2, Parts List, contains a list of parts used in the Radio Receiving Set AN/URR-74(V)2 and describes the characteristics of each part.

(1) Reference designation column. The Reference Designation column is arranged by major assemblies or units in Reference Designation order. That is, Unit 1 with its parts, etc. and next the major assembly with its parts etc. All parts attached to the unit are listed first in alphanumerical order as follows:

Unit	1
(Piece Parts)	1C1
	1E1
	etc.
Assembly	1A2
(Assembly Parts)	1A2C1
	1A2J1
	etc.
Subassembly	1A2A1
(Subassembly parts)	1A2A1C1
	1A2A1C2
	etc.

(2) Notes column. The Notes column shall contain equipment reference information such as serial number, model number, configuration data, etc.

(3) Name and description column. The Name and Description column indicates the nomenclature and electrical and mechanical descriptions of the part. The manufacturers code identification and part or drawing number is also indicated. Subsequent appearances of the same parts are referenced to the first appearance of that item; such as, 1CR2 SEMICONDUCTOR DEVICE, DIODE: same as 1CR1 etc. Parts which appear in more than five applications in the list are referenced to table 7-3 List of Common Item Descriptions by item number; for example item 1P15 reads CONNECTOR: see item 22. The full description for this item can be found under item 22 in the list of common item descriptions. When attaching hardware is used in five or more applications it is referenced in letter code in table 7-4 (List of Attaching Hardware).

(4) Figure number column. The Figure Number column shows the location of the part on the illustration by figure number and item number enclosed in parentheses (i.e., 7-3(6)).

c. List of Common Item Descriptions. Table 7-3, List of Common Item Descriptions, describes the parts lists which are used in more than five applications. Similar parts are grouped and arranged in alphabetical order. Item numbers are assigned consecutively, for example:

Item Number	Description
1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 µF ± 20 pct 5 vdc working, mfr 14632, part no. 34475-1
2	CAPACITOR, CERAMIC, FEEDTHRU: 0.01 µF, 20 pct 600 vdc, w/lug terminals, mfr 96733, part no. F1A6103K

d. List of Attaching Hardware. Table 7-4, List of Attaching Hardware, indicates the attaching hardware used in five or more applications. Items are listed in letter code sequence and contain item nomenclature and description. They are indicated in the parts list by letter code and quantity in parentheses, for example, (attaching hardware) A(6). Items used in fewer than five applications are completely identified on parts list.

e. List of Manufacturers. Table 7-5, List of Manufacturers contains the names, addresses, and manufacturers Federal Supply Code identification (H4-2). This list is presented in numerical sequence.

7-2. PARTS LOCATION ILLUSTRATIONS. Figures 7-1 through 7-41 are included to provide positive and rapid location of the parts listed in the parts list.

Table 7-1. List of Major Units

Unit Number	Nomenclature		Page Number
	Name of Unit	Designation	
Unit 1	Radio Receiving Set	AN/URR-74(V)2	7-3

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1		RECEIVING SET, RADIO AN/URR-74(V)2: receives am., fm, cw, usb, lsb and isb emissions over frequency range of 5 kHz to 29.99999 MHz; mfr 14632, part no. WJ-8718/MCM-5/ISB-5/NAV	7-1, 7-2 Sh 1 & 2 7-3
1C1 Thru 1C4		CAPACITOR: see item 12	7-2 Sh 1 (1,2,4,3)
1C5, 1C6		CAPACITOR: see item 10	7-2 Sh 1 (10,11)
1C7 Thru 1C12		CAPACITOR: see item 4	7-3 (10,6-9,44)
1C13		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 2.5-11 pF, 350 vdc N300, mfr 72982, part no. 538-01182-5-11	7-3 (21)
1C14		CAPACITOR: see item 12	7-3 (42)
1C15		CAPACITOR: see item 4	7-3 (57)
1CR1, 1CR2		SEMICONDUCTOR DEVICE, DIODE: 200 v, 5.0 amp maximum, 10-32 stud mount, mfr 80131, part no. 1N1614	7-1 (41,43)
1E1		TERMINAL, STUD: insulated, 21/32 in. high 4-40 x 5-32 in. deep female thread, mfr 92825, part no. 7A1A1	7-3 (52)
1E2, 1E3		TERMINAL: same as 1E1	7-3 (50,51)
1E4		TERMINAL, STUD: double turret, 4-40, tapped mount, mfr 71279, part no. 160-2381-01-05-00	7-3 (49)
1E5		TERMINAL, STUD: feed thru insulated, Teflon base gold finish post, .157 in. dia mounting, mfr 04013, part no. SFU16Y	
1F1		FUSE, CARTRIDGE: 1 amp, 3 ag, slo blo, 1/4 in. by 1 1/4 in. long, glass tube, mfr 71400, part no. MDL1	7-1 (45)
1F2		FUSE: same as 1F1	7-1 (47)
1J1		Not Used	
1J2		CONNECTOR, RECEPTACLE, ELECTRICAL: 9 position, D-style, accepts no. 20 crimp sockets, mfr 00779, part no. 205203-1	7-3 (48)
1J3 Thru 1J5		Not Used	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1J6		CONNECTOR, RECEPTACLE, ELECTRICAL: sub-miniature, straight, 50-ohm, gold plated, mfr 80058, part no. UG1619	7-3 (19)
1J7 Thru 1J12		Not Used	
1J13		JACK, TELEPHONE: 3 conductor open ckt mfr 82389, part no. L12B	7-1 (24)
1J14		CONNECTOR, RECEPTACLE, ELECTRICAL: multipin, 13 sockets, box mount, mfr 77820, part no. JTP02RE10-13S	7-1 (49)
L1		COIL, RADIO FREQUENCY: fixed molded, 2.2 μH, 10 pct, phenolic core, mfr 99800, part no. 1537-20	7-3 (22)
1M1		METER, signal strength/line audio: 0-1 ma dc with zero adjust, 1.75 in. wide by 1.75 in. high by 1.625 in. deep, mfr 14632, part no. 380122	7-1 (3)
1M2		METER, ELAPSED, TIME: 0-9999 hours, 0.5 in. square with unassembled mounting flange, mfr 82227, part no. K19763 W	7-1 (26)
1MP1, 1MP2		HANDLE, BOW: die cast zinc alloy ASTMAC41A (XXV), 5.15 in. long by .38 in. wide by 1.75 in. high, 3 .188 in. dia holes spaced 1.875 off-center and 2 ea 6-32 tapped holes 4.750 in. apart, mfr 14632, part no. 32306	7-1 (16, 25)
1MP3		WINDOW DISPLAY: non-glare circular polarized plastic filter, gray, .030 in. thk by 4.23 in. long by .80 in. wide, mfr 14632, part no. 18390-1	7-1 (14)
1MP4, 1MP5		KNOB: round, indicator dot, .720 in. dia, .250 in. shaft, glossy black, mfr 21604, part no. PS70D1/8	7-1 (22, 23)
1MP6 Thru 1MP21		SWITCH BUTTON: shell with yellow indicator, .677 in. long by .355 in. wide by .689 in. deep, mfr 31918, part no. FA101-blk w/yel	7-1 (2, 4-13, 17-21)

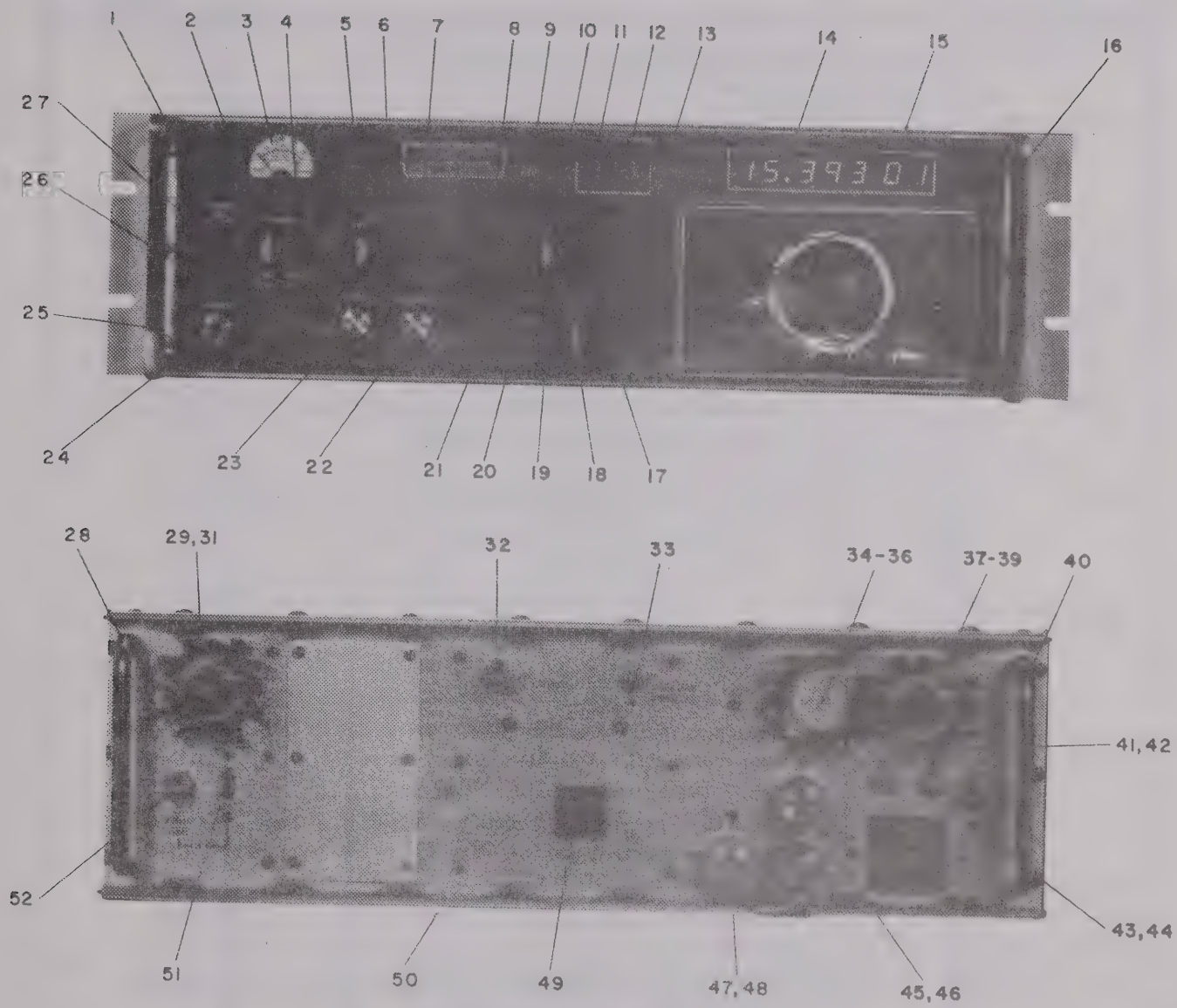


Figure 7-1. Radio Receiving Set AN/URR-74 (V)2, Front and Rear View

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1MP22, 1MP23		HANDLE: round .31 in. dia, 4 in. mtg centers, 10-32 tap holes, nickel plated, mfr 88245, part no. B1012-12	7-1 (28, 40)
1MP24, 1MP25		DIODE MOUNTING HARDWARE: for case 56, contains 10-32 acorn nut, steel lock washer, solder terminal, flat steel washer, mica washer and Teflon bushing, mfr 14632, part no. 280060	7-1 (42, 44)
1MP26 Thru 1MP52		HOUSING; RECEPTACLE: insulated pods, nylon, straight style, .790 in. long by .230 in. wide by .235 in. high, mfr 00779, part no. 1-480417-0	7-2 Sh 2 (85-111)
1MP53		TRANSISTOR COVER: TO-3 nylon with snap-in screw insulator, mfr 13103, part no. 8903NW	7-1 (34)
1MP54		SWITCH BUTTON: shell with red indicator, .677 in. long by .355 in. wide by .689 in. deep, mfr 31918, part no. FA101-blk w/red	7-1 (1)
1MP55		COVER ASSEMBLY, TOP: .050 in. thk al, aly sh, 5052-H32 chemical film chromate finish, 16.62 in. wide by 18.75 in. long, mfr 14632, part no. 580031-1	7-1 (15)
1MP56		COVER ASSEMBLY, BOTTOM: .050 in. thk al, aly sh, 5052-H32 chemical film chromate finish, 16.62 in. wide by 18.75 in. long, mfr 14632, part no. 580031-2	7-1 (50)
1P1 Thru 1P5		Not Used	
1P6		CONNECTOR: see item 20	7-3 (3)
1P7 Thru 1P12		Not Used	
1P13		CONNECTOR, PLUG ASSEMBLY: consist of 3 pos housing, contacts, no. 24 awg wire, 50-ohm coax cable, mfr 14632, part no. 34704	7-3 (26)
1P14 Thru 1P21		Not Used	
1P22		CONNECTOR, PLUG, ASSEMBLY: consist of 3 pos housing, contacts, no. 24 awg wire, coax cable, mfr 14632, part no. 34529-2	7-3 (54)
1P23		CONNECTOR, PLUG, ASSEMBLY: consist of 3 pos housing, contacts, no. 24 awg wire, coax cable, mfr 14632, part no. 34529-3	7-3 (41)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1P24		CONNECTOR, PLUG, ASSEMBLY: consist of double row 16 pos housing, contacts, no. 24 awg wire, coax cable, shielded twisted pair wire, (283 1/2) Teflon wire, mfr 14632, part no. 43594-1	7-2 Sh 1 (9)
1P25 Thru 1P32		Not Used	
1P33 Thru 1P36		CONNECTOR: see item 20	7-2 Sh 1 (18, 22, 6, 24)
1P37		Not Used	
1P38		CONNECTOR: see item 20	7-2 Sh 1 (7)
1P39, 1P40		CONNECTOR: see item 19	7-2 Sh 1 (50)
1P41 Thru 1P44		CONNECTOR: see item 20	7-3 (15-18)
1P45 Thru 1P47		Not Used	
1P48		CONNECTOR, PLUG ASSEMBLY: consist of 3 pos housing, contacts no. 24 awg wire, coax cable, mfr 14632, part no. 34529-1	7-3 (28)
1P49 Thru 1P51		Not Used	
1P52 Thru 1P56		CONNECTOR: see item 19	7-2 Sh 2 (56-60)
1P57		CONNECTOR: see item 21	7-3 (1)
1P58		CONNECTOR: see item 20	7-3 (2)
1R1		RESISTOR, VARIABLE: 25 k ohms, 10 pct, 1 w, log taper lock bushing, mfr 01121, part no. 70A3L036L253A	7-1 (33)
1R2		RESISTOR: see item 46	7-3 (23)
1R3		RESISTOR, FIXED, COMPOSITION: 200 ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. di Sh 1 by .02 in. dia lead, mfr 81349, part no. RCR07G201JS	7-2 Sh 1 (12)
1R4		RESISTOR, FIXED, COMPOSITION: 10 ohms 5 pct .5 w, 350 V rated, .375 in. long body by .14 in. dia by .03 in. dia leads, mfr 81349, part no. RCR20G100JS	7-2 Sh 1 (13)
1RA1		HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT: finned extrusion for T0-3 cases, .75 in. high by 1.78 in. long by 1.78 in. wide, black anodized, mfr 98978, part no. UP2-T03-CB	7-1 (38)
1RA2, 1RA3		HEAT SINK: same as 1RA1	7-1 (36, 31)
1S1		SWITCH, PUSH: dpdt action, 2 amp, 115 vac, TV5 rated, solder terminals on top, pc spikes at bottom, brass silver plated, mfr 31918, part no. N30-2A-TV5	7-1 (27)

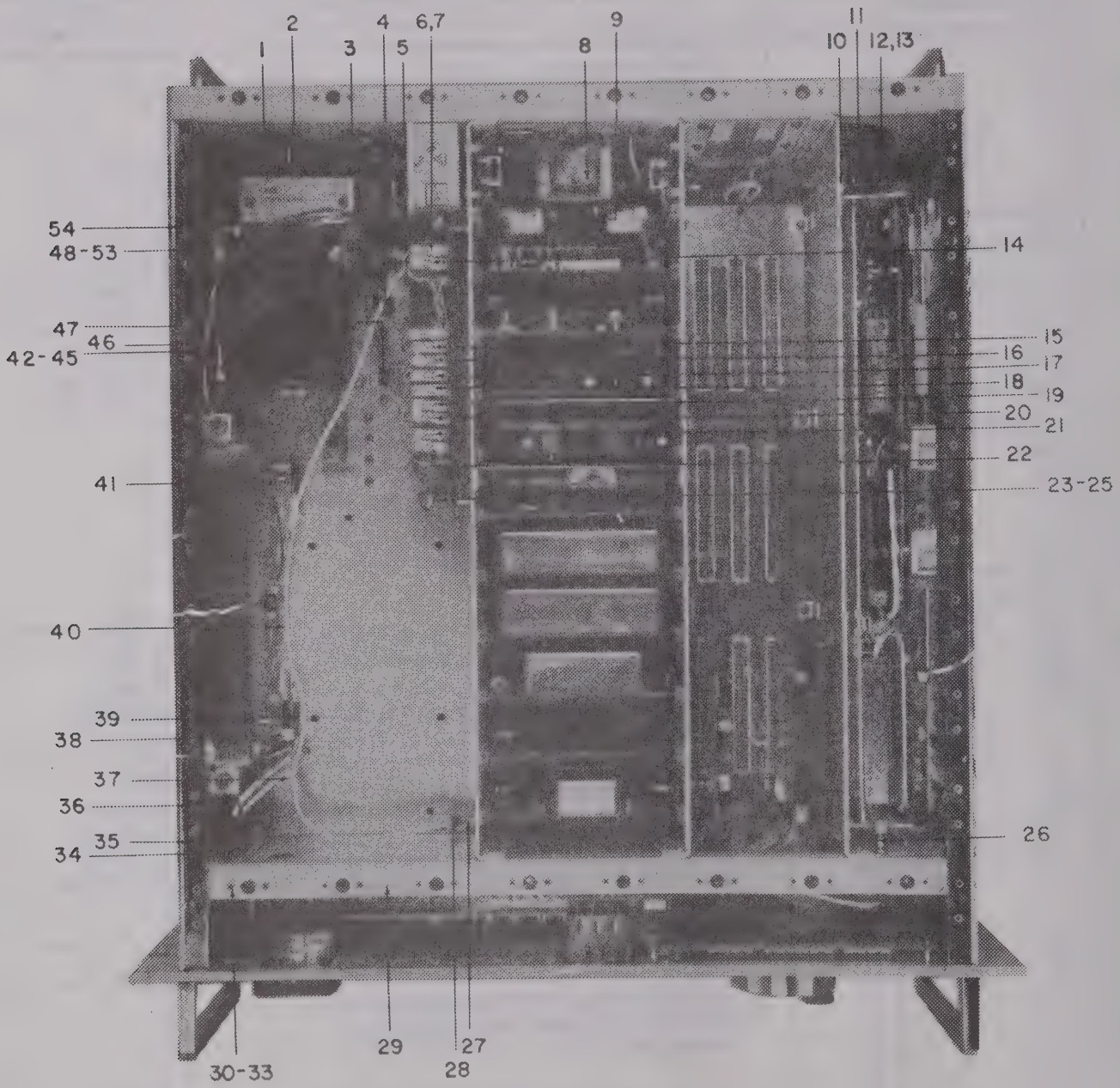


Figure 7-2. Radio Receiving Set AN/URR-74(V)2, Top View (Sheet 1 of 2)

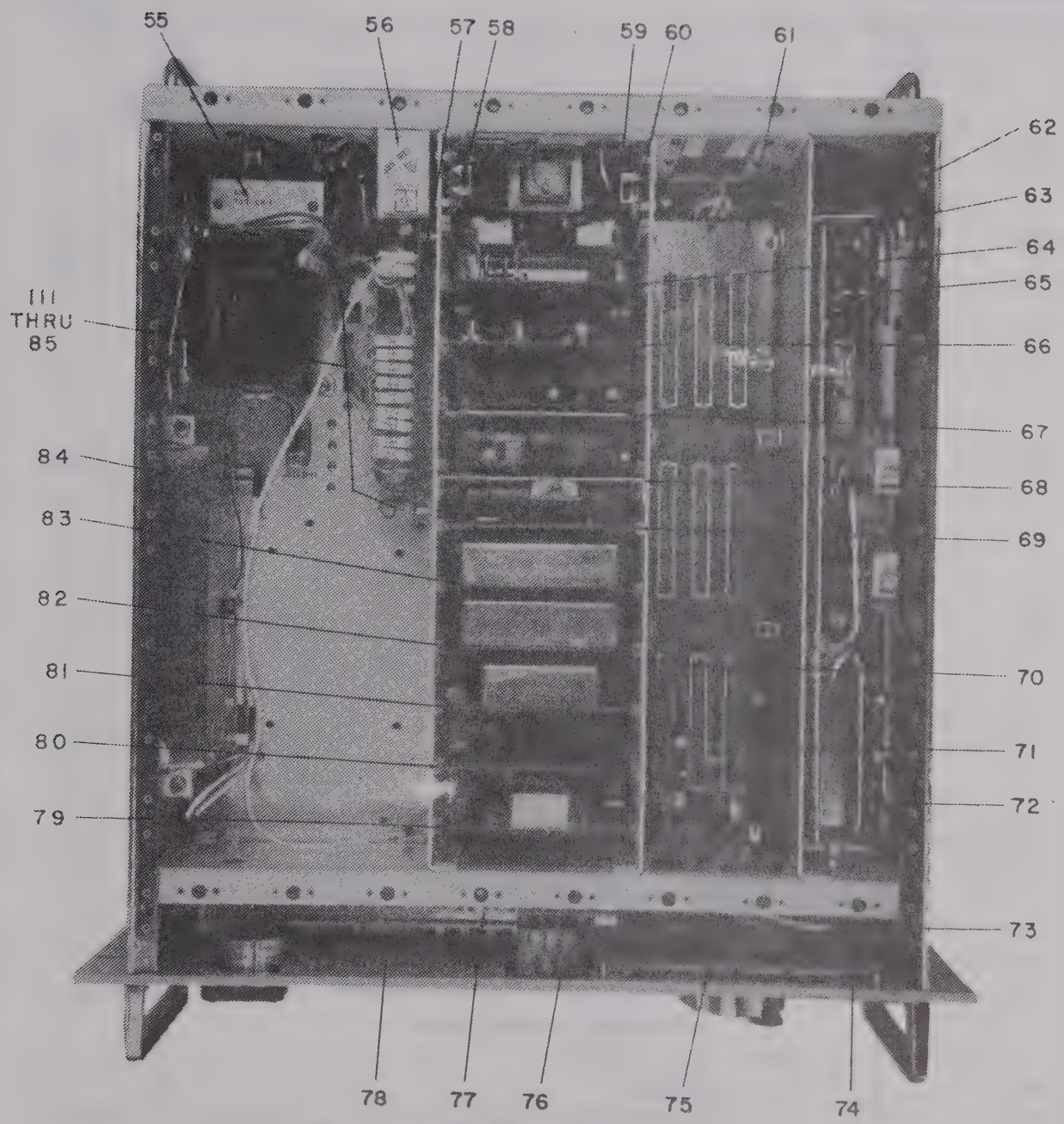


Figure 7-2. Radio Receiving Set AN/URR-74(V)2, Top View (Sheet 2 of 2)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1S2		SWITCH SLIDE: dpdt screwdriver, less voltage indication, mfr 82389, part no. 11A1211	7-1 (51)
1S3		SWITCH, SLIDE: dpdt 2 amp 250 V 115/230 V, mfr 82389, part no. EPS1-SL1	7-2 Sh 1 (54)
1S4		SWITCH: same as 1S2	7-2 Sh 1 (47)
1T1		TRANSFORMER, POWER: 3.19 in. wide by 3.26 in. long by 3.84 high, core mat EI-125, primary no. 1, 2 terminals, PR1 no. 2, 3 terminals, sec no. 2, 3 terminals, sec no. 2, 3 terminals, 115 v, 220-230 v, mfr 14632, part no. 380083	7-2 Sh 1 (46)
1T2		TRANSFORMER, AUDIO: 75 Hz to 10 kHz, ±1 dB at rated output, 3 ws continuous output, 6 terminals, 2.00 in. long by 1.875 in. wide by 1.460 in. high, mfr 14632, part no. 841004	7-2 Sh 1 (8)
1U1		VOLTAGE REGULATOR: fxd pos 15 v, 1.5 a TO3 package, mfr 80103, part no. LAS1515	7-1 (37)
1U1P1 Thru 1U1P3		CONNECTOR: same as 1P6	7-2 Sh 1 (15-17)
1U2		VOLTAGE REGULATOR: fixed neg, 15 v, 1.5 a TO3 package, mfr 80103, part no. LAS1815	7-1 (35)
1U2P1 Thru 1U2P3		CONNECTOR: same as 1P6	7-2 Sh 1 (19-21)
1U3		VOLTAGE REGULATOR: fixed positive 5 v, 3 amp, TO3 case, mfr 80103, part no. LAS1405	7-1 (29)
1U3P1 Thru 1U3P3		CONNECTOR: same as 1P6	7-2 Sh 2 (61-63)
1U4		VOLTAGE REGULATOR: fixed positive 12 v, 1 amp TO-220 case, mfr 07263, part no. 7812UC	7-3 (43)
1W1		Not Used	
1W2		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and UG1466/U connectors, 11 in. long, mfr 14632, part no. 34701-1	7-2 Sh 1 (40)
1W2J3		CONNECTOR: see item 18	7-2 Sh 1 (34)
1W2P3		CONNECTOR: see item 17	7-2 Sh 1 (4)

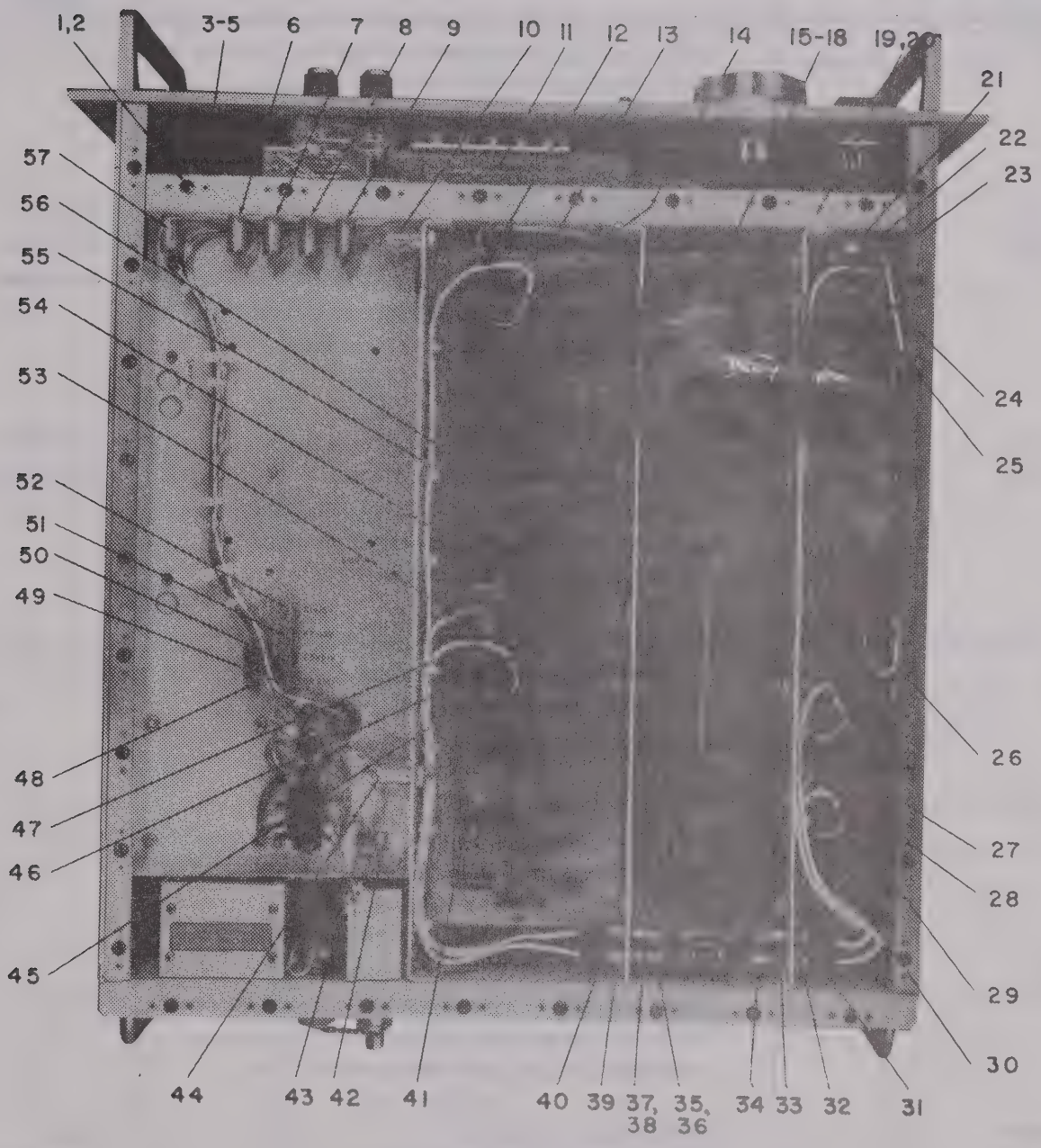


Figure 7-3. Radio Receiving Set AN/URR-74(V)2, Bottom View

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1W3		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and UG1466/U connectors, 15 1/2 in. long, mfr 14632, part no. 34701-2	7-2 Sh 1 (32)
1W3J4		CONNECTOR: see item 18	7-2 Sh 1 (26)
1W3P5		CONNECTOR: see item 17	7-2 Sh 1 (30)
1W4		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and UG1466/U connectors, 6 1/2 in. long, mfr 14632, part no. 34701-3	7-2 Sh 1 (36)
1W4J5		CONNECTOR: see item 18	7-2 Sh 1 (35)
1W4P4		CONNECTOR: see item 17	7-2 Sh 1 (39)
1W5		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with 2 UG1466/U connectors, 17 1/2 in. long, mfr 14632, part no. 34701-4	7-2 Sh 1 (33)
1W5P7, 1W5P8		CONNECTOR: see item 17	7-2 Sh 1 (31, 20)
1W6		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with 2 UG1465/U connectors, 5 in. long, mfr 14632 part no. 34701-5	7-3 (31)
1W6P7, 1W6P10		CONNECTOR: see item 16	7-3 (33, 35)
1W7		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with 2 UG1465/U connectors, 5 in. long, mfr 14632 part no. 34701-6	7-3 (33)
1W8		Not Used	
1W9		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohms with UG1468/U and 3 pin contact connector, 7 in. long, mfr 14632, part no. 34700-1	7-3 (49)
1W9J9		CONNECTOR: see item 18	7-3 (31)
1W9P14		CONNECTOR: see item 22	7-3 (27)
1W10		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and 3 pin contact connector, 17 1/2 in. long, mfr 14632, part no. 34700-2	7-3 (50)
1W10J10		CONNECTOR: see item 18	7-3 (32)
1W10P15		CONNECTOR: see item 22	7-3 (25)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List

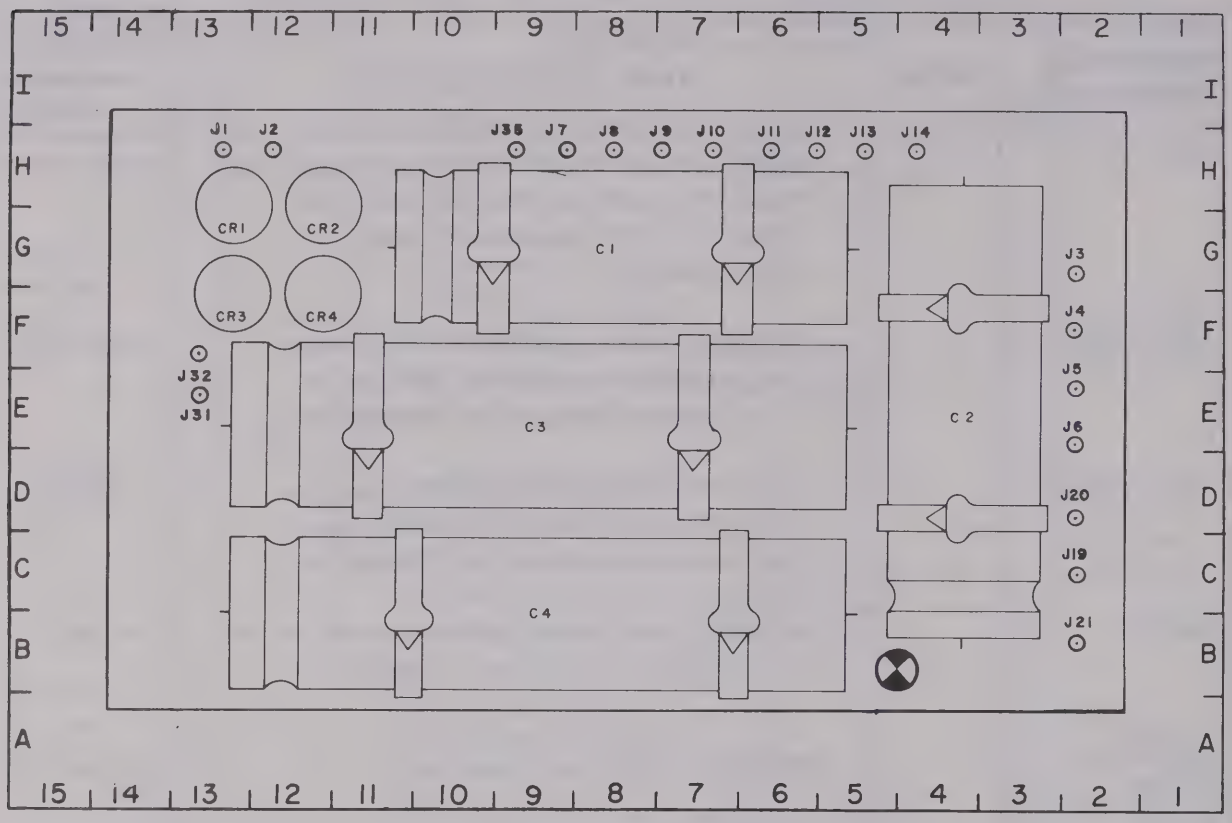
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1W11		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with bnc connector and 3 pin contact connector, mfr 14632, part no. 34702-1	7-3 (51)
1W11J11		CONNECTOR, RECEPTACLE, ELECTRICAL: str rr mt T0, 0.24 in. thk, dual crimp RG174, mfr 00779, part no. 2253987	7-1 (52)
1W11P16		CONNECTOR: see item 22	7-3 (30)
1W12		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and 3 pin contact connectors, 20 in. long, mfr 14632, part no. 34700-3	7-3 (52)
1W12J7		CONNECTOR: see item 18	7-3 (40)
1W12P17		CONNECTOR: see item 22	7-3 (14)
1W13		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and 3 pin contact connectors, 11 1/2 in. long, mfr 14632, part no. 34700-4	7-3 (53)
1W13J8		CONNECTOR: see item 18	7-3 (39)
1W13P18		CONNECTOR: see item 22	7-3 (45)
1W14		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with UG1468/U and 3 pin contact connectors, 6 in. long, mfr 14632, part no. 34700-5	7-3 (54)
1W14J1		CONNECTOR: see item 18	7-2 Sh 1 (27)
1W14P19		CONNECTOR: see item 22	7-3 (12)
1W15		CABLE ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with bnc connector and 3 pin contact connector, mfr 14632, part no. 34702-2	7-3 (55)
1W15J12		CONNECTOR, RECEPTACLE, ELECTRICAL: str rr mt T0, 0.24 in. thk, dual crimp RG174, mfr 00779, part no. 225398-7	7-1 (32)
1W15P20		CONNECTOR: see item 22	7-3 (47)
1W16		CONNECTOR ASSEMBLY: coax cable, .116 in. dia, 7 strands of .0067 wire, 50-ohm with 2 UG 1466/U connectors, 11 in. long, mfr 14632, part no. 34701-7	7-2 Sh 1 (37)
1W16P28, 1W16P29		CONNECTOR: see item 17	7-2 Sh 1 (38, 28)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1W17		CONNECTOR ASSEMBLY: no. 22 awg wire 13 1/2 in. long with faston tab and 3 conductor housing, mfr 14632, part no. 380005-1	7-2 Sh 1 (52)
1W17P21		CONNECTOR: see item 20	7-2 Sh 1 (5)
1W17P25		CONNECTOR: see item 19	7-2 Sh 1 (48)
1W18		CONNECTOR ASSEMBLY: no. 22 awg wire, 17 1/2 in. long with faston tab and 3 conductor housing, mfr 14632, part no. 380005-2	7-2 Sh 1 (44)
1W18P26		CONNECTOR: see item 20	7-2 Sh 1 (23)
1W18P27		CONNECTOR: see item 19	7-2 Sh 1 (42)
1W19		CONNECTOR ASSEMBLY: no. 22 awg wire, 14 1/2 in. long with faston tab and 3 conductor housing, mfr 14632, part no. 380005-3	7-2 Sh 1 (53)
1W19P32		CONNECTOR: see item 20	7-2 Sh 1 (14)
1W19P49		CONNECTOR: see item 19	7-2 Sh 1 (51)
1W20		CONNECTOR ASSEMBLY: no. 22 awg wire, 19 1/2 in. long with faston tab and 3 conductor housing, mfr 14632, part no. 380005-4	7-2 Sh 1 (45)
1W20P50		CONNECTOR: see item 20	7-2 Sh 1 (25)
1W20P51		CONNECTOR: see item 19	7-2 Sh 1 (43)
1XF1		FUSEHOLDER: 3 ag size, rfi shielded panel mount, 2 3/16 in. long by 7/8 in. dia, screw-on cap, mfr 75915, part no. 340255	7-1 (46)
1XF2		FUSEHOLDER: same as 1XF1	7-1 (48)
1XU1		SOCKET, VOLTAGE REGULATOR: transistor TO-3 case, black with 2 ea 0.1 µF capacitors and 3 Teflon wires, mfr 14632, part no. 34506-1	7-1 (39)
1XU2		SOCKET, VOLTAGE REGULATOR: transistor TO-3 case, black with 2 ea 0.1 µF capacitors and 3 Teflon wires, mfr 14632, part no. 34506-2	7-1 (37)
1XU3		SOCKET VOLTAGE REGULATOR: transistor TO-3 case, black with 2 ea 47 µF capacitors and 3 Teflon wires, mfr 14632, part no. 34506-3	7-1 (30)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A1		CIRCUIT CARD ASSEMBLY: power distribution, circuit board, 0.500 in. thick by 6.25 in. long by 3.70 in. connected by solder terminals, mfr 14632, part no. 76240-2	7-2 Sh 2 (57)
1A1C1, 1A1C2		CAPACITOR, FIXED, ELECTROLYTIC: aluminum, 2200 µF M10P75 25 v axial leads, .937 in. dia by 3.25 in. long, mfr 56289, part no. 39D228G025HP4	7-4 (8G, 4E)
1A1C3, 1A1C4		CAPACITOR,FIXED, ELECTROLYTIC: aluminum, 8000 µF M10P25 15 v axial leads, 1.062 in. dia by 3.750 in. long, mfr 56289, part no. 39D808G015JT4	7-4 (9E, 9B)
1A1CR1		SEMICONDUCTOR, DEVICE, DIODE: rectifier 100 PRV 3.0 amp silicon, mfr 80131, part no. 1N4998	7-4 (13H)
1A1CR2 Thru 1A1CR4		SEMICONDUCTOR: same as 1A1CR1	7-4 (12H, 13F, 12F),
1A1J1 Thru 1A1J14		CONNECTOR: see item 21	7-4 (13H, 12H, 2G, 2F, 2E, 9H, 8H, 7H, 6H, 5H, 4H)
1A1J15 Thru 1A1J18		Not Used	
1A1J19 Thru 1AJ21		CONNECTOR: see item 21	7-4 (2C, 2D, 2B)
1A1J22 Thru 1A1J30		Not Used	
1A1J31, 1AJ32		CONNECTOR: see item 21	7-4 (13E, 13F)
1A1J33, 1AJ34		Not Used	
1A1J35		CONNECTOR: see item 21	7-4 (9H)
1A1MP1		PRINTED WIRING BOARD: basic etched circuit, less the assembled parts for item 1A1, mfr 14632, part no. 76240P1	7-4 (5B)
		(Attaching Hardware)	
		SCREW, MACHINE: pan head cross recessed 4-40 x 7/16 crescent, mfr 96906, part no. MS51957-16, (4), C(4), A(4)	



PARTS LOCATION INDEX
ASSEMBLY 1A1

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	8G	J8	8H
C2	4E	J9	7H
C3	9E	J10	7H
C4	9B	J11	6H
CR1	13H	J12	6H
CR2	12H	J13	5H
CR3	13F	J14	4H
CR4	12F	J19	2C
J1	13H	J20	2D
J2	12H	J21	2B
J3	2G	J31	13E
J4	2F	J32	13F
J5	2E	J35	9H
J6	2E	MP1	5B
J7	9H		

Figure 7-4. Power Distribution 76240-2 (1A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A2		RF FILTER ASSEMBLY: brass chassis with rfi shielded cover, restricts signals entering the receiver to the intended frequency band of 5 kHz to 30 MHz, 4.75 in. long by 1.90 in. wide by 1.20 in. high, connected by 2 cables, mfr 14632, part no. 791616-2	7-2 Sh 2 (56)
1A2E1		CONNECTOR, TERMINATION, ELECTRICAL: 50-ohm right angle for RG188 cable, 10-32 chassis mount, 21/32 in. by 19/32 in. mfr 19505, part no. 144/188	7-5 (4)
1A2J1		CONNECTOR, RECEPTACLE, ELECTRICAL: bulkhead type N, 50-ohm 1.37/64 in. by 13/16 in., mfr 80058, part no. UG680/U	7-5 (3)
1A2L1		COIL, RADIO FREQUENCY: toroidal, no. 24 SNS wire, wrapped 8 turns around a doughnut shaped core, mfr 14632, part no. 20681-208	7-5 (2)
1A2P1		CONNECTOR: see item 17	7-5 (1)
1A2A1		CIRCUIT CARD ASSEMBLY: filter input 30 MHz low pass, circuit board restricts signals entering the receiver to the intended frequency band of 5 kHz to 30 MHz, 0.500 in. thick by 4.00 in. long by 1.30 in. wide, connected by solder terminals, mfr 14632, part no. 280093	7-6
1A2A1C1		CAPACITOR: see item 10	7-6 (9C)
1A2A1C2		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 120 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD121G03	7-6 (9C)
1A2A1C3		CAPACITOR, FIXED, DIELECTRIC: 10 pF 0.5 pF tol, 500 v, mfr 81349, part no. CM05CD100D03	7-6 (8C)
1A2A1C4		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 180 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD181G03	7-6 (8D)
1A2A1C5		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 33 pF, 2 pct, 500 v, mfr 81349, part no. CM05ED330G03	7-6 (7C)
1A2A1C6		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 150 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD151G03	7-6 (7D)

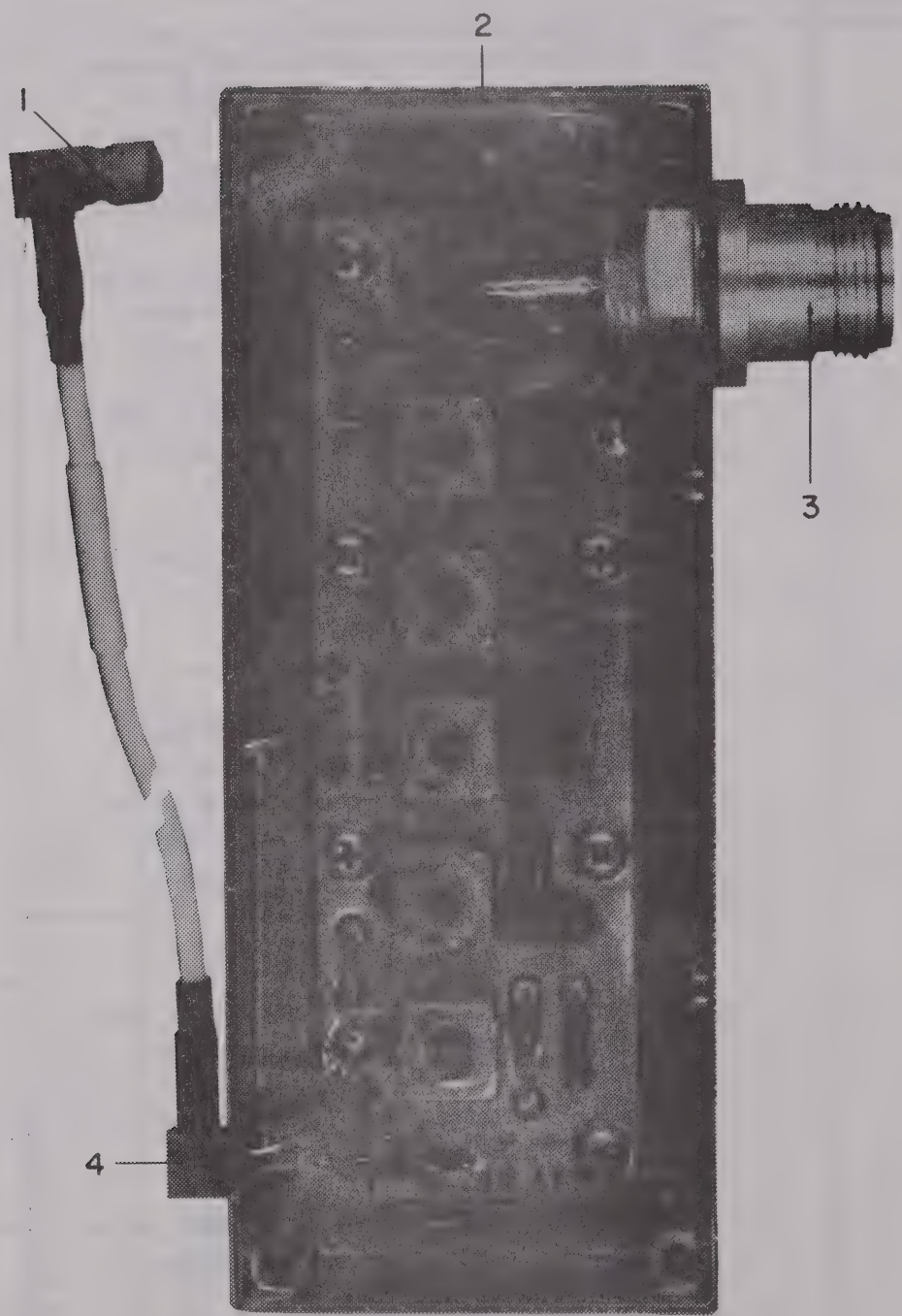
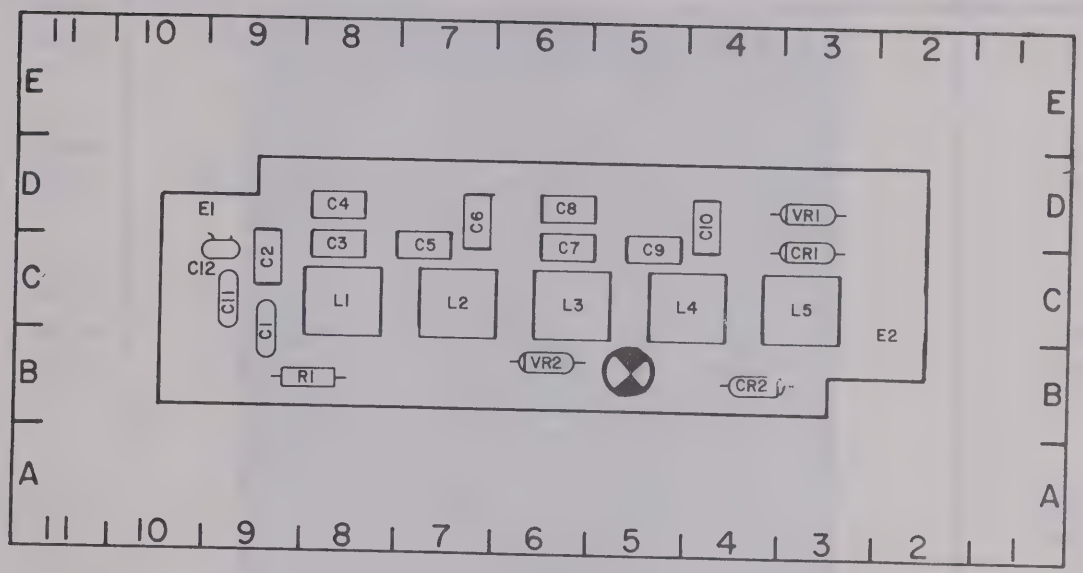


Figure 7-5. Input Filter 791616-2 (1A2)



PARTS LOCATION INDEX
ASSEMBLY 1A2A1

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	9C	CR1	3C
C2	9C	CR2	4B
C3	8C	L1	8C
C4	8D	L2	7C
C5	7C	L3	6C
C6	7D	L4	4C
C7	6C	L5	3C
C8	6D	MP1	5B
C9	5C	R1	8B
C10	4D	VR1	3D
C11	9C	VR2	6B
C12	9C		

Figure 7-6. 30 MHz Lp Input Filter 280093 (1A2A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A2A1C7		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 39 pF, 2 pct, 500 v, mfr 81349, part no. CM05ED390G03	7-6 (6C)
1A2A1C8		CAPACITOR: same as 1A2A1C6	7-6 (6D)
1A2A1C9		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 18 pF, 5 pct, 500 v, mfr 81349, part no. CM05CD180J03	7-6 (5C)
1A2A1C10		CAPACITOR: same as 1A2A1C6	7-6 (4D)
1A2A1C11		CAPACITOR: see item 10	7-6 (9C)
1A2A1C12		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 47 pF, 5 pct, 100 v NPO, mfr 72982, part no. 8111-100-COGO-470J	7-6 (9C)
1A2A1CR1, 1A2A1CR2		SEMICONDUCTOR: see item 61	7-6 (3C, 4B)
1A2A1L1 Thru 1A2A1L4		COIL, RADIO FREQUENCY: variable 0.351-0.429 µH, .480 in. high by .400 in. sq, 4 leads and 2 mounting tabs, mfr 71279, part no. 558-7107-08	7-6 (8C, 7C, 6C, 4C)
1A2A1L5		COIL, RADIO FREQUENCY: variable 0.297-0.363 µH, .480 in. high by .400 in. sq, 4 leads and 2 mounting tabs, mfr 71279, part no. 558-7107-07	7-6 (3C)
1A2A1MP1		PRINTED WIRING BOARD: basic etched circuit, less the assembled parts for item 1A2A1, mfr 14632, part no. 280093P1	7-6 (5B)
1A2A1R1		RESISTOR: see item 38	7-6 (8B)
1A2A1VR1		SEMICONDUCTOR DEVICE, DIODE: zener 6.2 v, silicon, .300 in. long body by .125 in. dia, .02 dia leads, mfr 80131, part no. 1N753A	7-6 (3D)
1A2A1VR2		SEMICONDUCTOR: same as 1A2A1VR1	7-6 (6B)
		(Attaching Hardware)	
		D(6), C(6), A(6)	
1A3		INPUT CONVERTER: brass chassis with rfi cover, converts signals from rf filter up in frequency and filters them, 1.152 in. thick by 6.94 in. long by 3.25 in. wide, mfr 14632, part no. 791592	7-2 Sh 2 (84)

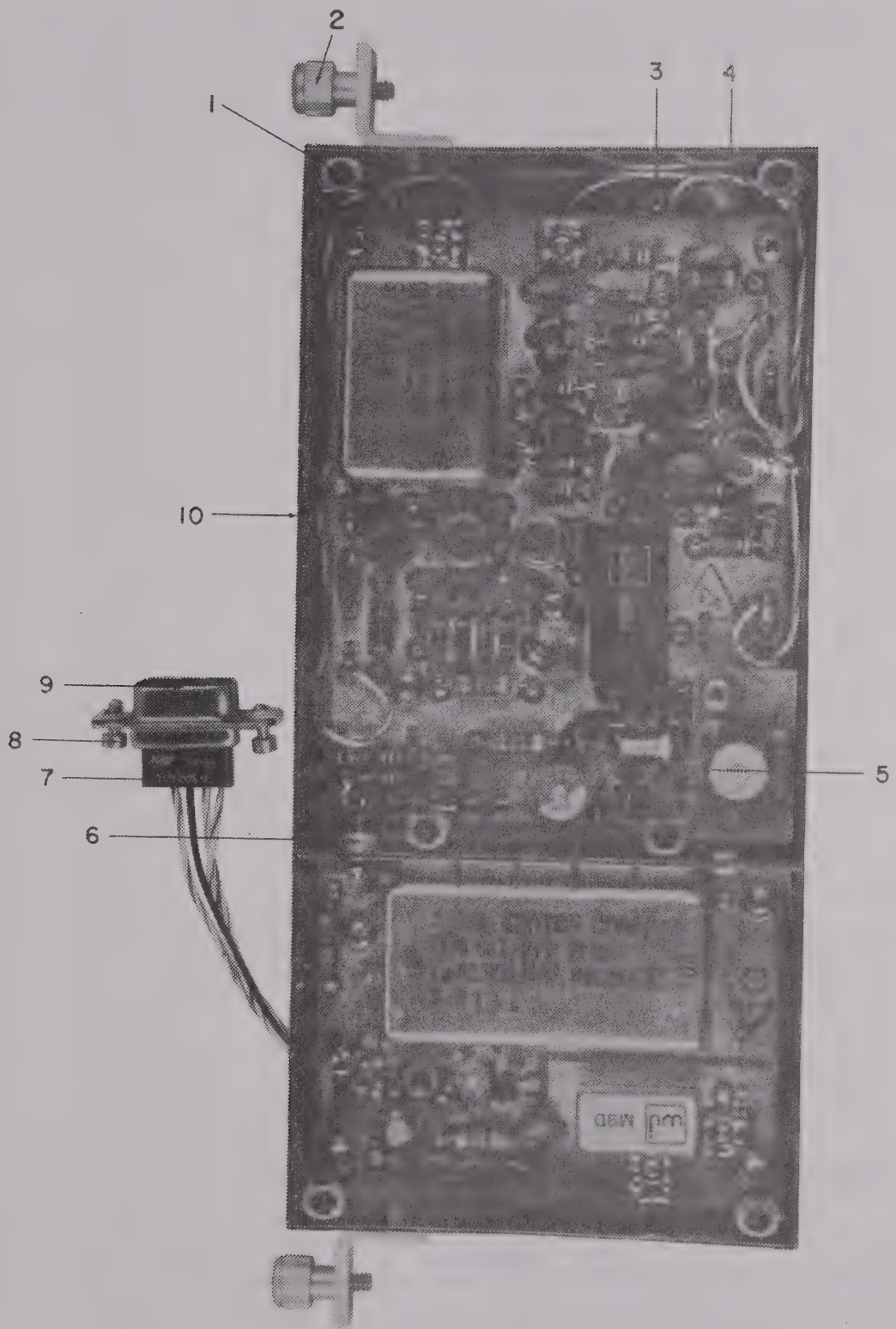
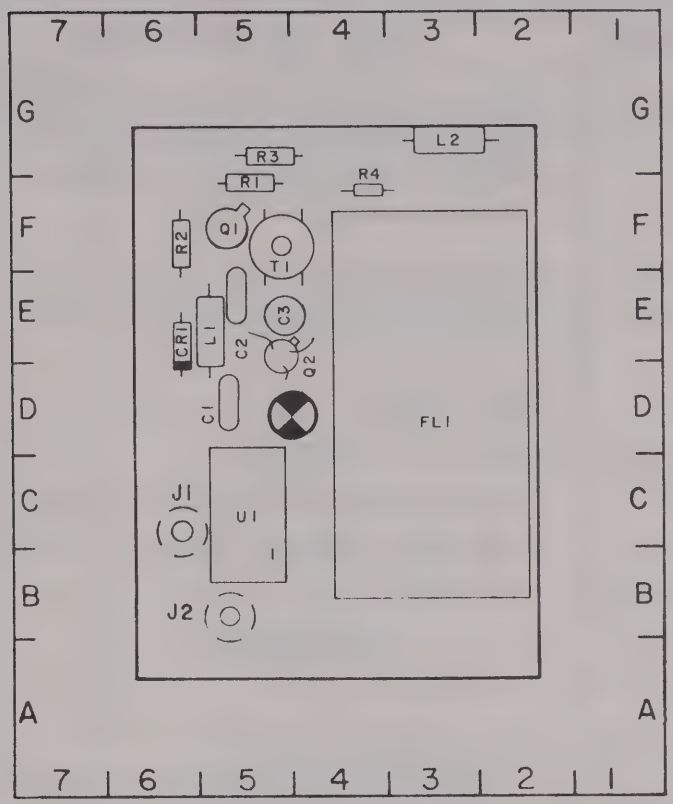


Figure 7-7. Input Converter 791592 (1A3)



PARTS LOCATION INDEX
ASSEMBLY 1A3A1

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	5D	MP3	5D
C2	5E	Q1	5F
C3	5E	Q2	5E
CR1	6E	R1	5F
FL1	3D	R2	6F
J1	6C	R3	5G
J2	5B	R4	4F
L1	5E	RA1	UNDER Q2
L2	3G	T1	5F
MP1	UNDER Q1	U1	5C
MP2	UNDER Q2		

Figure 7-8. 1st Mixer 1st If. 34748 (1A3A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A1FL1		FILTER, BAND PASS: 42.905 MHz CF 28 kHz bw, passivated metallic finish, 2.10 in. long by 1.05 in. wide by .77 in. high with 4.040 dia pins and 4-40 stud, mfr 14632, part no. 92123	7-8 (3D)
1A3A1J1, 1A3A1J2		CONNECTOR, RECEPTACLE, ELECTRICAL: sma straight pc mount, mfr 14632, part no. 34520-1	7-8 (6C, 5B)
1A3A1L1, 1A3A1L2		COIL: see item 14	7-8 (5E, 3G)
1A3A1MP1, 1A3A1MP2		INSULATOR: see item 26	7-8 (UNDER Q1-Q2)
1A3A1MP3		PRINTED WIRING BOARD: basic etched circuit, less assembled parts, for item 1A3A1, mfr 14632, part no. 34748P1 (Attaching Hardware) G(4), C(4), A(4)	7-8 (5D)
1A3A1Q1		TRANSISTOR: see item 63	7-8 (5F)
1A3A1Q2		TRANSISTOR: silicon epitaxial junction N-channel field effect, TO46, mfr 12498, part no. CP643	7-8 (5E)
1A3A1R1		RESISTOR: see item 47	7-8 (5F)
1A3A1R2		RESISTOR, FIXED, COMPOSITION: 82 ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349	7-8 (6F)
1A3A1R3		RESISTOR: see item 35	7-8 (5G)
1A3A1R4	Note 1	RESISTOR, FIXED, COMPOSITION: 130 ohms 5 pct .125 w, .145 in. long body by .062 in. dia by .015 in. lead, dia mfr 81349, part no. RCR05G131JS	7-8 (4F)
1A3A1R4	Note 1	RESISTOR, FIXED, COMPOSITION: 150 ohms 5 pct .125 w, .145 in. long body by .062 in. dia by .015 in. lead, dia mfr 81349, part no. RCR05G151JS	7-8 (4F)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A1R4	Note 1	RESISTOR, FIXED, COMPOSITION: 160 ohms 5 pct .125 w, .145 in. long body by .062 in. dia by .015 in. lead, dia mfr 81349, part no. RCR05G161JS	7-8 (4F)
1A3A1RA1		HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT: 1 piece for TO18, wraparound, tapped hole mounted, gold chromate , mfr 13103, part no. 1118C	7-8 (UNDER Q2)
1A3A1T1		TRANSFORMER, RADIO FREQUENCY: toroid mount, 4 terminals, 1.5 in. long leads by .340 in. dia wide by .078 in. high, mfr 14632, part no. 22295-52	7-8 (5F)
1A3A1U1		MIXER, FREQUENCY: 2-500 MHz high level lo plus 20 dbm, double balanced, .800 in. long by .400 in. wide by .425 in. high, 8 pin pc mount, mfr 27956, part no. M9D	7-8 (5C)
1A3A2		CIRCUIT CARD ASSEMBLY: 2nd mixer, 2nd if., circuit board, frequency of 10.7 MHz, 0.500 in. thick by 4.00 in. long by 3.00 in. wide, connected by solder terminals, mfr 14632, part no. 34749	7-9
1A3A2C1		CAPACITOR: same as 1C13	7-9 (10D)
1A3A2C2, 1A3A2C3		CAPACITOR: see item 1	7-9 (9D, 9B)
1A3A2C4 Thru 1A3A2C8		CAPACITOR: see item 11	7-9 (7G, 7E, 6D, 8D, 6F)
1A3A2C9		CAPACITOR: see item 12	7-9 (8A)
1A3A2C10 Thru 1A3A2C13		CAPACITOR: see item 2	7-9 (3D, 4B, 5B, 4C)
1A3A2C14		CAPACITOR, FIXED, MICA DIELECTRIC: 47 pF 2 pct 500 v, mfr 81349, part no. CM05ED470G03	7-9 (5B)
1A3A2C15		CAPACITOR: see item 2	7-9 (3B)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

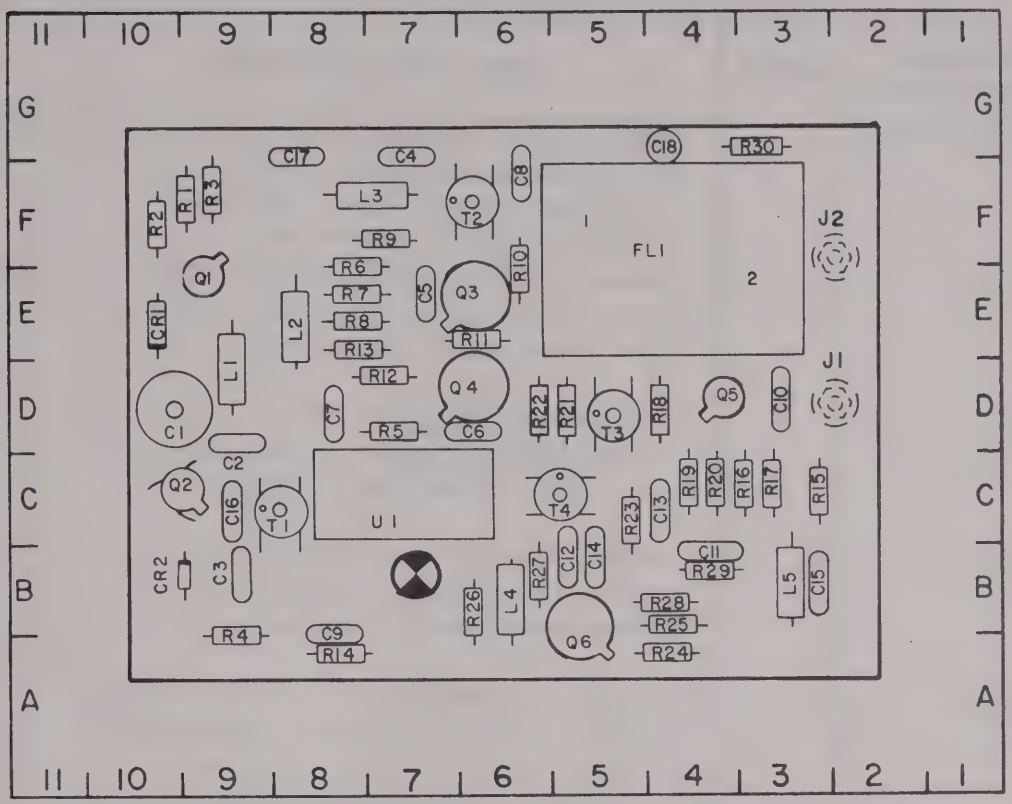
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2C16		CAPACITOR, FIXED, CERAMIC: 4.7 pF .1 pF tol 500 v npo, tubular, mfr 72982, part no. 301-000COHO-479B	7-9 (9C)
1A3A2C17		CAPACITOR: see item 10	7-9 (8F)
1A3A2C18		CAPACITOR, FIXED, ELECTROLYTIC: 4.7 µF, 20 pct 35 v, tantalex, mfr 56289, part no. 196D475X0035JE3	7-9 (4G)
1A3A2CR1		SEMICONDUCTOR: same as 1A3A1CR1	7-9 (10E)
1A3A2CR2		SEMICONDUCTOR, DEVICE, DIODE: pin, dc power dissipation 250 MW, piv vbr, operating temp range -65° C to +150° C, 4.32 in. long body by 1.93 in. wide, mfr 28480, part no. 5082-3039	7-9 (9B)
1A3A2FB1 Thru 1A3A2FB3		FERRITE BEAD: see item 23	7-9 (UNDER Q3)
1A3A2FL1		FILTER, BAND PASS: 10.7 MHz cf 16 kHz bw, stud metric 2 places 040 in. dia terminals 2 places, 1.42 in. long by 1.05 in. wide by .75 in. high, mfr 14632, part no. 92124	7-9 (5F)
1A3A2J1, 1A3A2J2		CONNECTOR: same as 1A3A1J1	7-9 (3D, 3F)
1A3A2L1 Thru 1A3A2L3		COIL: see item 14	7-9 (9D, 8E, 7F)
1A3A2L4		COIL, RADIO FREQUENCY: fixed 0.56 µH 15 pct .125 in. dia by .25 in. long, mfr 99848, part no. 202-11	7-9 (6B)
1A3A2L5		COIL: see item 14	7-9 (3B)
1A3A2MP1		INSULATOR DISK: see item 25	7-9 (UNDER Q1)
1A3A2MP2		INSULATOR DISK: same as 1A3A2MP1	7-9 (UNDER Q5)
1A3A2MP3		INSULATOR DISK: 3 lead .08 in. thick for TO-5 case, mfr 13103, part no. 7717-22DAP	7-9 (UNDER Q4))
1A8A2MP4		INSULATOR DISK: same as 1A3A2MP3	7-9 (UNDER Q6)
1A3A2MP5		INSULATOR: see item 26 (2)	7-9 (UNDER Q2)
1A3A2MP6		PRINTED WIRING BOARD: basic etched circuit less the assembled parts, for item 1A3A2, mfr 14632 part no. 34749P1	7-9 (7B)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
		(Attaching Hardware) G(4), C(4), A(4)	
1A3A2Q1		TRANSISTOR: see item 63	7-9 (9E)
1A3A2Q2		TRANSISTOR: same as 1A3A1Q2	7-9 (9C)
1A3A2Q3		TRANSISTOR: hf power amplifier npn silicon TO-39, mfr 80131, part no. 2N5109	7-9 (6E)
1A3A2Q4		TRANSISTOR: same as 1A3A2Q3	7-9 (6D)
1A3A2Q5		TRANSISTOR: see item 64	7-9 (4D)
1A3A2Q6		TRANSISTOR: same as 1A3A2Q3	7-9 (5B)
1A3A2R1		RESISTOR: see item 47	7-9 (9F)
1A3A2R2		RESISTOR: same as 1A3A1R2	7-9 (10F)
1A3A2R3	Note 1	RESISTOR, FIXED, COMPOSITION: 9.1 ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G9R1JS	7-9 (9F)
1A3A2R3	Note 1	RESISTOR: see item 35	7-9 (9F)
1A3A2R3	Note 1	RESISTOR, FIXED, COMPOSITION: 11 ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G110JS	7-9 (9F)
1A3A2R4		RESISTOR, FIXED COMPOSITION: 1.8 k ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no, RCR07G182JS	7-9 (9A)
1A3A2R5		RESISTOR: see item 46	7-9 (7D)
1A3A2R6		RESISTOR, FIXED, COMPOSITION: 3.3 k ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G332JS	7-9 (8E)
1A3A2R7		RESISTOR: see item 47	7-9 (8E)
1A3A2R8		RESISTOR: see item 37	7-9 (8E)
1A3A2R9		RESISTOR: same as 1R3	7-9 (7F)
1A3A2R10		RESISTOR: see item 35	7-9 (6E)
1A3A2R11		RESISTOR: see item 54	7-9 (6E)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2R12		RESISTOR, FIXED, COMPOSITION: 4.7-ohm 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G4R7JS	7-9 (7D)
1A3A2R13		RESISTOR, FIXED, COMPOSITION: 68-ohm 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G680JS	7-9 (8E)
1A3A2R14		RESISTOR, FIXED, COMPOSITION: 390-ohm 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G391JS	7-9 (8A)
1A3A2R15		RESISTOR: same as 1A3A2R13	7-9 (3C)
1A3A2R16		RESISTOR: see item 50	7-9 (3C)
1A3A2R17		RESISTOR: see item 37	7-9 (3C)
1A3A2R18		RESISTOR: see item 35	7-9 (4D)
1A3A2R19		RESISTOR: see item 45	7-9 (4C)
1A3A2R20		RESISTOR: see item 46	7-9 (4C)
1A3A2R21		RESISTOR: see item 58	7-9 (5D)
1A3A2R22		RESISTOR: see item 42	7-9 (6D)
1A3A2R23		RESISTOR, FIXED, COMPOSITION: 15-ohm 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G150JS	7-9 (5C)
1A3A2R24		RESISTOR: see item 37	7-9 (4A)
1A3A2R25		RESISTOR: see item 55	7-9 (4B)
1A3A2R26		RESISTOR, FIXED, COMPOSITION: 330-ohm 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G331JS	7-9 (6B)
1A3A2R27		RESISTOR: see item 35	7-9 (6B)
1A3A2R28		RESISTOR, FIXED, COMPOSITION: 12-ohm 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G120JS	7-9 (4B)
1A3A2R29		RESISTOR: see item 42	7-9 (4B)
1A3A2R30		RESISTOR: see item 35	7-9 (3G)
1A3A2RA1		HEAT SINK: same as 1A3A1RA1	7-9 (UNDER Q2)
1A3A2T1		TRANSFORMER, RADIO FREQUENCY: toroid mount, 4 terminals, 1.5 in. long leads by .340 in. dia wide by .078 in. high, mfr 14632, part no. 22295-53	7-9 (8C)



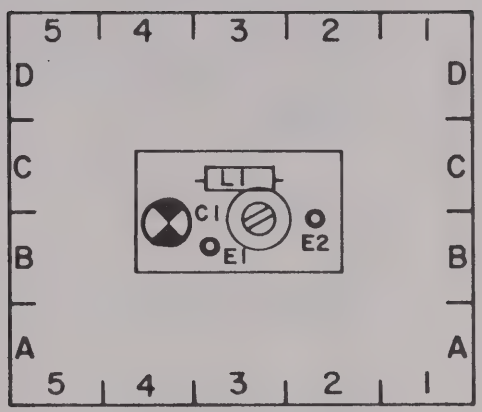
PARTS LOCATION INDEX
ASSEMBLY 1A3A2

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	10D	FB1	UNDER Q3	Q4	6D	R18	4D
C2	9D	FB2	UNDER Q3	Q5	4D	R19	4C
C3	9B	FB3	UNDER Q3	Q6	5B	R20	4C
C4	7G	FL1	5F	R1	9F	R21	5D
C5	7E	J1	3D	R2	10F	R22	6D
C6	6D	J2	3F	R3	9F	R23	5C
C7	8D	L1	9D	R4	9A	R24	4A
C8	6F	L2	8E	R5	7D	R25	4B
C9	8A	L3	7F	R6	8E	R26	6B
C10	3D	L4	6B	R7	8E	R27	6B
C11	4B	L5	3B	R8	8E	R28	4B
C12	5B	MP1	UNDER Q1	R9	7F	R29	4B
C13	4C	MP2	UNDER Q5	R10	6E	R30	3G
C14	5B	MP3	UNDER Q4	R11	6E	RA1	UNDER Q2
C15	3B	MP4	UNDER Q6	R12	7D	T1	8C
C16	9C	MP5	UNDER Q2	R13	8E	T2	6F
C17	8F	MP6	7B	R14	8A	T3	5D
C18	4G	Q1	9E	R15	3C	T4	5C
CR1	10E	Q2	0C	R16	3C	U1	7C
CR2	9B	Q3	6E	R17	3C		

Figure 7-9. 2nd Mixer 2nd If. 34749 (1A3A2)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2T2		TRANSFORMER, RADIO FREQUENCY: toroid mount, 4 terminals, 1.5 in. long leads by .340 in. dia wide by .078 in. high, mfr 14632, part no. 22295-54	7-9 (6F)
1A3A2T3		TRANSFORMER, RADIO FREQUENCY: toroid mount, 4 terminals, 1.5 in. long leads by .340 in. dia wide by .078 in. high, mfr 14632, part no. 22295-56	7-9 (5D)
1A3A2T4		TRANSFORMER, RADIO FREQUENCY: toroid mount, 4 terminals, 1.5 in. long leads by .340 in. dia wide by .078 in. high, mfr 14632, part no. 22295-55	7-9 (5C)
1A3A2U1		MIXER, FREQUENCY: 0.05-200 MHz hi-level double balanced fl atr 25 dB min pc mount, mfr 27956 part no. M9A	7-9 (7C)
1A3A3		CIRCUIT CARD ASSEMBLY: filter board, serves as a trap to minimize spurs at 10.79999, 10.805 and 10.810 frequencies, 0.500 in. thick by 1.10 in. long by .65 in. high, connected by solder terminals, mfr 14632, part no. 280080	7-10
1A3A3C1		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 9-35 pF 350 v N650, mfr 72982, part no. 538-011D9-35	7-10 (3B)
1A3A3L1		COIL, RADIO FREQUENCY: 0.33 μH 10 pct .375 in. long by .156 in. dia by .025 in. lead dia, phenolic core molded, mfr 99800, part no. 1537-04	7-10 (3C)
1A3A3MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A3A3, mfr 14632, part no. 288080P1	7-10 (4B)
		(Attaching Hardware)	
		SPACER, DELRIN: .25 in. long, .25 od, .152 in. dia id, mfr 14632, part no. 20753-37	
		SCREW, MACHINE: pan head cross recessed 4-40 x 5/8 cres, mfr 96906, part no. MS51957-18(1) C(1), A(1)	



PARTS LOCATION INDEX
ASSEMBLY 1A3A3

REF DESIG	LOCATION
C1	3B
L1	3C
MP1	4B

Figure 7-10. Filter Board 280080 (1A3A3)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4		CIRCUIT CARD ASSEMBLY: if. motherboard, provides support and interconnections for the if. section of the receiver, 0.500 in. thick by 14.40 in. long by 4.25 in. wide, connects by solder on connections, push-on plugs and a multipin cable assembly, mfr 14632, part no. 791569-4	7-2 Sh 2 (59)
1A4C1 Thru 1A4C29		CAPACITOR: see item 11	7-11 (4I, 5I, 6I, 7I, 8I, 9I)
1A4J1		TERMINAL: 8 pos, feedthru, .818 in. long x .025 in. sq, .50 below bd, mfr 00779, part no. PE914031-2	7-11 (29F)
1A4L1		CHOKE, RADIO FREQUENCY: .236 od, .394 in. long, 2 1/2 turns, 1 winding, ferrite choke, mfr 02114, part no. VK200-10-3B	7-11 (3C)
1A4L2		CHOKE: same as 1A4L1	7-11 (4D)
1A4MP1 Thru 1A4MP11		HOUSING: 30 positions, 3.234 in. long, .100 x .200 post centerline spacing, glass filled nylon, black, copper contacts gold plated, mfr 00779, part no. 117798-3	7-11 (XA1-XA11)
1A4MP12		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4, mfr 14632, part no. 791569P1 (Attaching Hardware) G(8), C(8), A(8)	7-11 (14F)
1A4P1		CABLE ASSEMBLY: 29 conductor flat flexible 1 plug, 5.5 in. with solder terminals, mfr 00779, part no. 88523-1	7-11 (6K)
1A4XA1 Thru 1A4XA11		CONTACT STRIP: 10 pins, combination contact economate I, wrap post .025 in. sq (100 X 200) copper alloy gold plated, mfr 00779, part no. PE7-14046	7-11 (2C, 5C, 8C, 10C, 13C, 15C, 18C, 21C, 23C, 26C, 28C
1A4A1		CIRCUIT CARD ASSEMBLY: 10.7 MHz filter switch, circuit board selects one of three signal paths as part of the overall receiver bandwidth determining scheme and provides additional if. amplification, 0.750 in. thk by 4.30 in. long by .385 in. wide, connected by plugging into motherboard, mfr 14632, part no. 791594-4	7-2 Sh 2 (79), 7-12

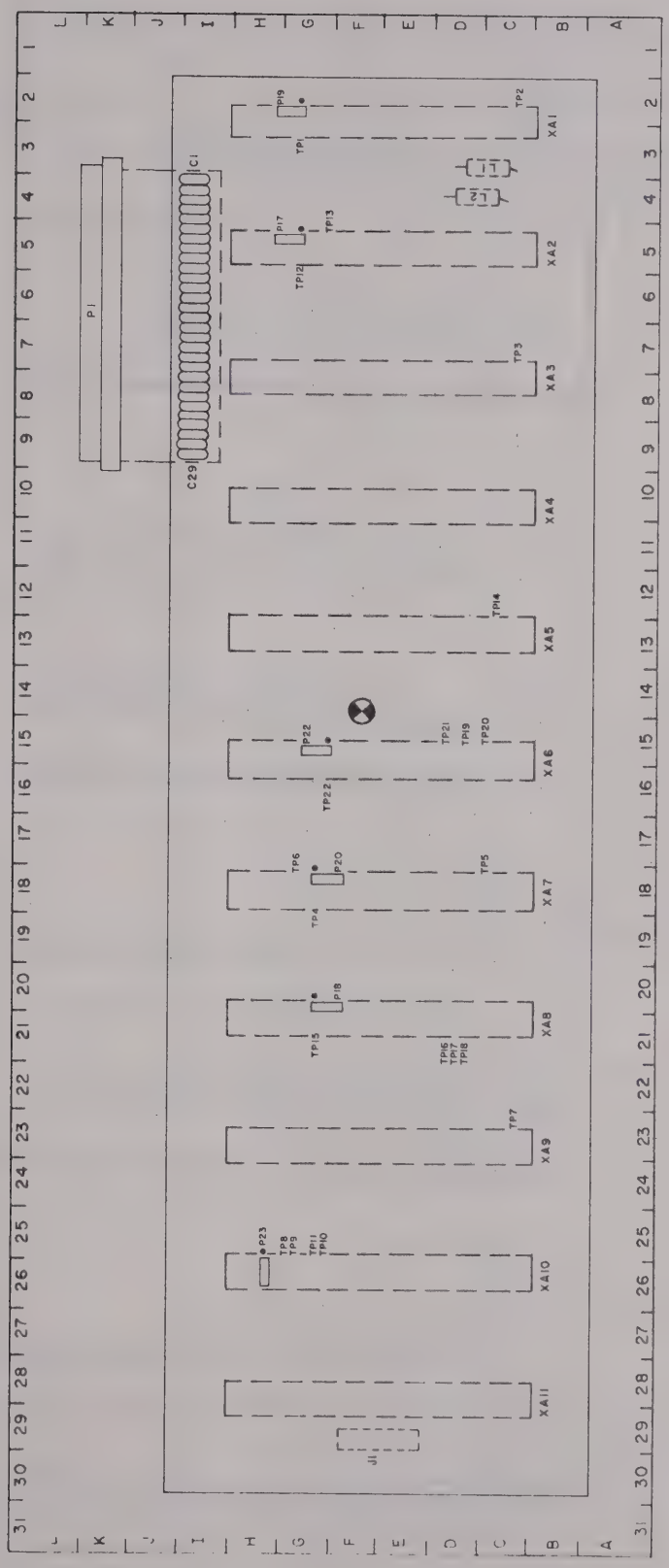


Figure 7-11. If. Motherboard 791569-4 (1A4)

PARTS LOCATION INDEX
ASSEMBLY 1A4

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	4I	C16	7I	L1	3C	XA1	2C
C2	4I	C17	7I	L2	4D	XA2	5C
C3	4I	C18	7I	MP1	XA1	XA3	8C
C4	4I	C19	7I	MP2	XA2	XA4	10C
C5	4I	C20	7I	MP3	XA3	XA5	13C
C6	5I	C21	8I	MP4	XA4	XA6	15C
C7	5I	C22	8I	MP5	XA5	XA7	18C
C8	5I	C23	8I	MP6	XA6	XA8	21C
C9	5I	C24	8I	MP7	XA7	XA9	23C
C10	5I	C25	8I	MP8	XA8	XA10	26C
C11	6I	C26	9I	MP9	XA9	XA11	28C
C12	6I	C27	9I	MP10	XA10		
C13	6I	C28	9I	MP11	XA11		
C14	6I	C29	9I	MP12	14F		
C15	6I	J1	29F	P1	6K		

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 91 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD910G03	7-12 (4B)
1A4A1C2 Thru 1A4A1C8		CAPACITOR: see item 11	7-12 (3G, 3E, 3C, 4G, 4E, 4C, 3H)
1A4A1C9		CAPACITOR: see item 12	7-12 (4H)
1A4A1C10		CAPACITOR: see item 11	7-12 (3F)
1A4A1C11		CAPACITOR: see item 12	7-12 (4F)
1A4A1C12		CAPACITOR: see item 11	7-12 (3D)
1A4A1C13		CAPACITOR: see item 12	7-12 (4D)
1A4A1C14		CAPACITOR: see item 11	7-12 (2E)
1A4A1C15 Thru 1A4A1C17		CAPACITOR: see item 12	7-12 (4H, 4F, 4D)
1A4A1C18 Thru 1A4A1C23		CAPACITOR: see item 11	7-12 (9G, 8H, 8F, 9D, 9E, 9C)
1A4A1C24 Thru 1A4A1C26		CAPACITOR: see item 12	7-12 (9H, 9E, 9C)
1A4A1C27		CAPACITOR: see item 3	7-12 (2C)
1A4A1C28		CAPACITOR: see item 11	7-12 (3C)
1A4A1C29		CAPACITOR: see item 11	7-12 (3C)
1A4A1C30		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 130 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD131G03	7-12 (9B)
1A4A1C31		CAPACITOR: see item 3	7-12 (5C)
1A4A1C32		CAPACITOR: same as 1A3A3C1	7-12 (3G)
1A4A1FL1		FILTER, BANDPASS: 10.7 MHz cf 3.2 kHz bandwidth, 1.42 in. long by 1.05 in. wide by .75 in. high, 2 metric studs and 2.040 in. dia terminals, mfr 14632, part no. 92126	7-12 (6H)
		(Attaching Hardware)	
		NUT, PLAIN HEX: 2.4 mm thick steel, nickel plated, 5.5 mm acrflt M3 metric thread (2)	
1A4A1FL2		FILTER, BANDPASS: 10.7 MHz cf 6 kHz bandwidth, 1.42 in. long by 1.05 in. wide by .75 in. high, 2 metric studs and 2.040 in. dia terminals, mfr 14632, part no. 92126	7-12 (6F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

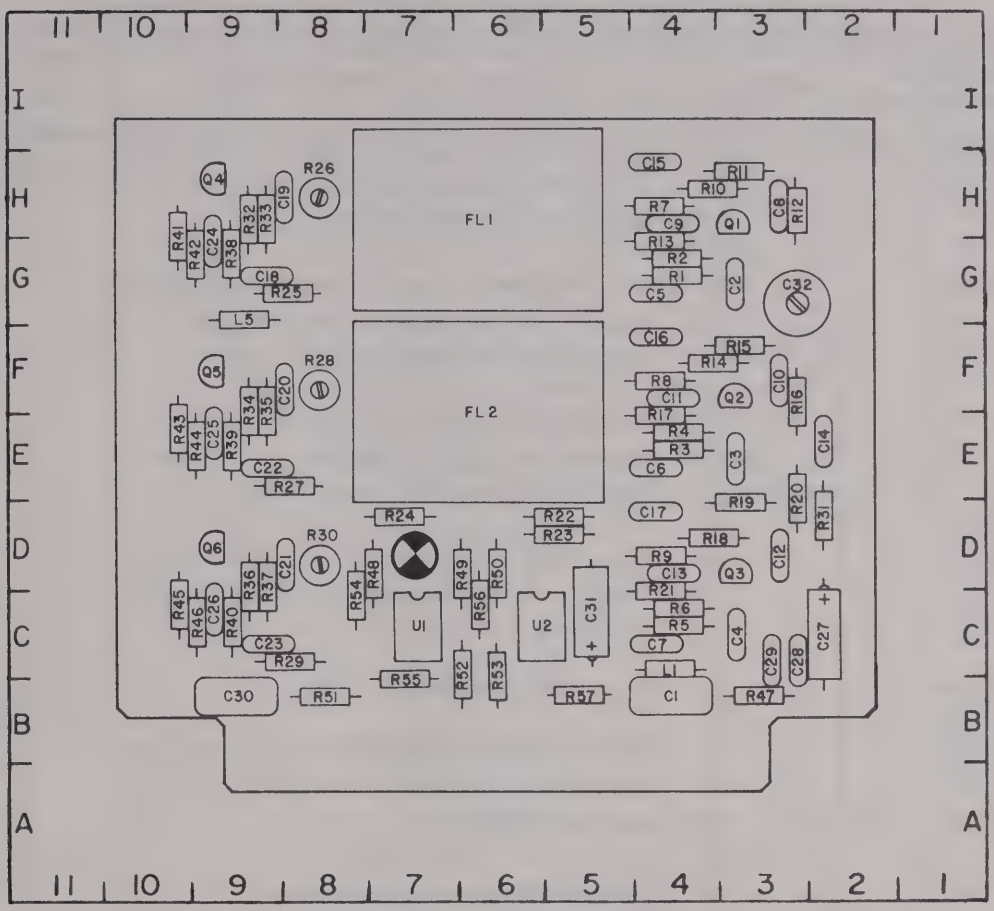
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
		(Attaching Hardware)	
		NUT, PLAIN HEX: 2.4 mm thick steel, nickel plated, 5.5 mm across flat M3 metric thread (2)	
1A4A1L1		COIL, RADIO FREQUENCY: fixed molded 1.5 µF, 10 pct, phenolic core min Q33, .155 in. dia by .375 in. long, mfr 99800, part no. 1537-16	7-12 (4B)
1A4A1L2 Thru 1A4A1L4		Not Used	
1A4A1L5		COIL: same as 1A3L1	7-12 (9G)
1A4A1MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A1, mfr 14632, part no. 791594P1	7-12 (7D)
1A4A1Q1 Thru 1A4A1Q6		TRANSISTOR: see item 66	7-12 (3H, 3F, 3D, 9H, 9F, 9D)
1A4A1R1		RESISTOR, FIXED, COMPOSITION: 13 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G133JS	7-12 (4G)
1A4A1R2		RESISTOR, FIXED, COMPOSITION: 3.0 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G302JS	7-12 (4G)
1A4A1R3		RESISTOR: same as 1A4A1R1	7-12 (4E)
1A4A1R4		RESISTOR: same as 1A4A1R2	7-12 (4E)
1A4A1R5		RESISTOR: same as 1A4A1R1	7-12 (4C)
1A4A1R6		RESISTOR: same as 1A4A1R2	7-12 (4C)
1A4A1R7		RESISTOR, FIXED, COMPOSITION: 680 ohms, 5 pct, .25 w, 250 v rated .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G681JS	7-12 (4H)
1A4A1R8		RESISTOR: same as 1A4A1R7	7-12 (4F)
1A4A1R9		RESISTOR: same as 1A4A1R7	7-12 (4D)
1A4A1R10		RESISTOR: see item 35	7-12 (3H)
1A4A1R11		RESISTOR: see item 46	7-12 (3H)
1A4A1R12		RESISTOR: see item 45	7-12 (3H)
1A4A1R13		RESISTOR: see item 51	7-12 (4G)
1A4A1R14		RESISTOR: see item 35	7-12 (3F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1R15		RESISTOR: see item 46	7-12 (3F)
1A4A1R16		RESISTOR: see item 45	7-12 (3F)
1A4A1R17		RESISTOR: see item 51	7-12 (4E)
1A4A1R18		RESISTOR: see item 35	7-12 (4D)
1A4A1R19		RESISTOR: see item 46	7-12 (3D)
1A4A1R20		RESISTOR: see item 45	7-12 (3E)
1A4A1R21		RESISTOR: see item 51	7-12 (4C, 5D)
1A4A1R22			
1A4A1R23		RESISTOR: see item 58	7-12 (5D)
1A4A1R24		RESISTOR: see item 51	7-12 (7D)
1A4A1R25		RESISTOR: see item 36	7-12 (8G)
1A4A1R26		RESISTOR, VARIABLE: 200 ohms 10 pct .5 w, helitrim, sealed metal housing 1/4 in. dia single turn, 3 pins, mfr 73138, part no. 62PR200	7-12 (8H)
1A4A1R27		RESISTOR: see item 36	7-12 (8E)
1A4A1R28		RESISTOR: same as 1A4A1R26	7-12 (8F)
1A4A1R29		RESISTOR: see item 36	7-12 (8C)
1A4A1R30		RESISTOR: same as 1A4A1R26	7-12 (8D)
1A4A1R31		RESISTOR: see item 45	7-12 (2D)
1A4A1R32		RESISTOR: see item 48	7-12 (9H)
1A4A1R33		RESISTOR: see item 56	7-12 (9H)
1A4A1R34		RESISTOR: see item 48	7-12 (9F)
1A4A1R35		RESISTOR: see item 56	7-12 (9F)
1A4A1R36		RESISTOR: see item 48	7-12 (9D)
1A4A1R37		RESISTOR: see item 56	7-12 (9D)
1A4A1R38 Thru 1A4A1R40		RESISTOR: see item 58	7-12 (9G, 9E, 9C)
1A4A1R41		RESISTOR: see item 35	7-12 (10G)
1A4A1R42		RESISTOR: same as 1A3A2R28	7-12 (9G)
1A4A1R43		RESISTOR: see item 35	7-12 (10E)
1A4A1R44		RESISTOR: same as 1A3A2R28	7-12 (9E)
1A4A1R45		RESISTOR: see item 35	7-12 (10C)
1A4A1R46		RESISTOR: same as 1A3A2R28	7-12 (9C)
1A4A1R47		RESISTOR: see item 45	7-12 (3B)
1A4A1R48 Thru 1A4A1R50		RESISTOR: see item 36	7-12 (7D, 6D, 6D)
1A4A1R51		RESISTOR, FIXED, COMPOSITION: 56 ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia, .02 in. dia leads, mfr 81349, part no. RCR07G560JS	7-12 (8B)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1R52		RESISTOR, FIXED, COMPOSITION: 33 k ohms 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. dia leads, mfr 81349, part no. RCR07G333JS	7-12 (6B)
1A4A1R53		RESISTOR, FIXED, COMPOSITION: 6.2 k ohms 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia, .02 in. dia leads, mfr 81349, part no. RCR07G622JS	7-12 (6B)
1A4A1R54 Thru 1A4A1R56		RESISTOR: see item 38	7-12 (8C, 7B, 6C)
1A4A1R57		RESISTOR: see item 36	7-12 (5B)
1A4A1U1		INTEGRATED CIRCUIT: dual operational amplifier, consisting of two 741 op ampl in a single package, 8 pin dual in line, mfr 18324, part no. MC1458N	7-12 (7C)
1A4A1U2		INTEGRATED CIRCUIT: same as 1A4A1U1	7-12 (6C)
1A4A2		CIRCUIT CARD ASSEMBLY: converter 10.7 MHz/455 kHz, circuit board, converts signals from 10.7 MHz to 455 kHz, 0.500 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr 14632, part no. 71430-2	7-2 Sh 2 (80), 7-13
1A4A2C1 Thru 1A4A2C6		CAPACITOR: see item 11	7-13 (3C, 3E, 4D, 5D, 4C, 5F)
1A4A2C7		CAPACITOR, FIXED, MICA DIELECTRIC: 68 pF, 2 pct, 500 v, mfr 81349, part no. CM05ED680G03	7-13 (5E)
1A4A2C8		CAPACITOR, FIXED, MICA DIELECTRIC: 360 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD361G03	7-13 (7E)
1A4A2C9		CAPACITOR, FIXED, MICA DIELECTRIC: 3900 pF, 2 pct, 500 v, mfr 81349, part no. CM06FD392G03	7-13 (7C)
1A4A2C10		CAPACITOR: same as 1A4A2C9	7-13 (6C)
1A4A2C11		CAPACITOR, FIXED, MICA DIELECTRIC: 1600 pF, 2 pct, 500 v, mfr 81349, part no. CM06FD162G03	7-13 (5C)



PARTS LOCATION INDEX
ASSEMBLY 1A4A1

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	4B	C27	2C	R10	3H	R36	9D
C2	3G	C28	3C	R11	3H	R37	9D
C3	3E	C29	3C	R12	3H	R38	9G
C4	3C	C30	9B	R13	4G	R39	9E
C5	4G	C31	5C	R14	3F	R40	9C
C6	4E	C32	3G	R15	3F	R41	10G
C7	4C	FL1	6H	R16	3F	R42	9G
C8	3H	FL2	6F	R17	4E	R43	10E
C9	4H	L1	4B	R18	4D	R44	9E
C10	3F	L5	9G	R19	3D	R45	10C
C11	4F	MP1	7D	R20	3E	R46	9C
C12	3D	Q1	3H	R21	4C	R47	3B
C13	4D	Q2	3F	R22	5D	R48	7D
C14	2E	Q3	3D	R23	5D	R49	6D
C15	4H	Q4	9H	R24	7D	R50	6D
C16	4F	Q5	9F	R25	8G	R51	8B
C17	4D	Q6	9D	R26	8H	R52	6B
C18	9G	R1	4G	R27	8E	R53	6B
C19	8H	R2	4G	R28	8F	R54	8C
C20	8F	R3	4E	R29	8C	R55	7B
C21	9D	R4	4E	R30	8D	R56	6C
C22	9E	R5	4C	R31	2D	R57	5B
C23	9C	R6	4C	R32	9H	U1	7C
C24	9H	R7	4H	R33	9H		
C25	9E	R8	4F	R34	9F		
C26	9C	R9	4D	R35	9F		

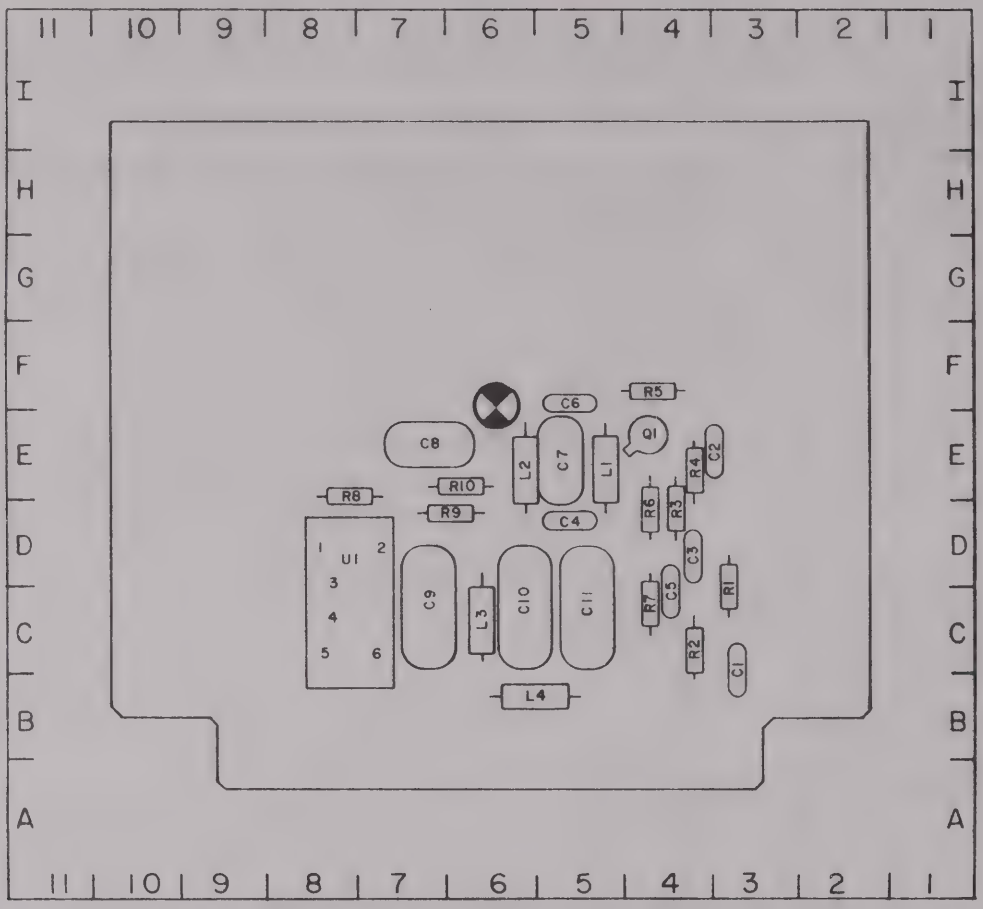
Figure 7-12. 10.7 MHz Filter Switch 791594-4 (1A4A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A2L1		COIL, RADIO FREQUENCY: 100 µH, 5 pct, .375 in. long by .156 in. dia by .025 in. lead dia, phenolic core, molded, mfr 99800, part no. 1537-76	7-13 (5E)
1A4A2L2		COIL, RADIO FREQUENCY: 3.3 µH, 10 pct, .375 in. long by .156 in. dia by .025 in. lead dia, phenolic core, molded, mfr 99800, part no. 1537-24	7-13 (6E)
1A4A2L3		COIL, RADIO FREQUENCY: 12 µH, 10 pct, .375 in. long by .156 in. dia by .025 in. lead dia, phenolic core, molded, mfr 99800, part no. 1537-38	7-13 (6C)
1A4A2L4		COIL, RADIO FREQUENCY: 82 µH, 5 pct, .375 in. long by .156 in. dia by .025 in. dia, mfr 99800, part no. 1537-72	7-13 (6B)
1A4A2MP1		INSULATOR: see item 24	7-13 (UNDER Q1)
1A4A2MP2		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A2, mfr 14632, part no. 71430P1	7-13 (6F)
1A4A2Q1		TRANSISTOR: rf-if. silicon npn low power TO-72 case, mfr 18714, part no. 2N2708	7-13 (5E)
1A4A2R1		RESISTOR: same as 1A4A1R51	7-13 (3D)
1A4A2R2		RESISTOR: same as 1A4A1R51	7-13 (4C)
1A4A2R3		RESISTOR: see item 37	7-13 (4D)
1A4A2R4		RESISTOR: see item 41	7-13 (4E)
1A4A2R5		RESISTOR: see item 56	7-13 (4F)
1A4A2R6		RESISTOR, FIXED, COMPOSITION: 39 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. dia leads, mfr 81349, part no. RCR07G390JS	7-13 (4D)
1A4A2R7		RESISTOR: see item 58	7-13 (4C)
1A4A2R8		RESISTOR, FIXED, COMPOSITION: 300 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. dia leads, mfr 81349, part no. RCR07G301JS	7-13 (7E)
1A4A2R9		RESISTOR, FIXED, COMPOSITION: 18 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia, .02 in. dia leads, mfr 81349, part no. RCR07G180JS	7-13 (6D)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A2R10		RESISTOR: same as 1A4A2R8	7-13 (6E)
1A4A2U1		MIXER, FREQUENCY: balanced, 0.05-200 MHz 30 dB min, pc mount 1.020 in. long by .515 in. wide by .280 in. high, mfr 27956, part no. M6A	7-13 (8D)
1A4A3		CIRCUIT CARD ASSEMBLY: 455 kHz filter switch, circuit board receives the 3rd if. signal from the 10.7 MHz/455 kHz converter and selects one of three signal paths, 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr 14632, part no. 791595-6	7-26 (81)
1A4A3C1 Thru 1A4A3C7		CAPACITOR: see item 10	7-14 (2F, 3H, 2F, 3H, 9H, 4C, 8C)
1A4A3C8		CAPACITOR: see item 3	7-14 (8B)
1A4A3C9 Thru 1A4A3C20		CAPACITOR: see item 10	7-14 (10B, 9F, 2D, 3F, 3E, 9D, 2C, 3D, 3C, 10D, 6C)
1A4A3FL1		FILTER, BANDPASS: 325 Hz bandwidth 455 kHz center frequency, 2.61 in. long by 1.36 in. wide by .93 in. high, two .040 in. dia terminals and two .040 in. dia ground pins, mfr 14632, part no. 92128	7-14 (6G)
1A4A3FL2		FILTER, BANDPASS: 1 kHz bandwidth 455 kHz center frequency, 2.61 in. long by 1.36 in. wide by .93 in. high, two .040 in. dia terminals and two .040 in. dia ground pins mfr 14632, part no. 92127	7-14 (6E)
1A4A3L1 Thru 1A4A3L3		COIL: see item 15	7-14 (2H, 2F, 3D)
1A4A3MP1 Thru 1A4A3MP6		INSULATOR: see item 24 (6)	7-14 (UNDER Q1-Q6)
1A4A3MP7		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A3, mfr 14632, part no. 791595P1	7-14 (6B)
1A4A3Q1 Thru 1A4A3Q6		TRANSISTOR: see item 63	7-14 (2G, 10H, 2E, 10E, 2C, 10C)
1A4A3R1		RESISTOR: see item 48	7-14 (3H)
1A4A3R2		RESISTOR: see item 52	7-14 (3G)



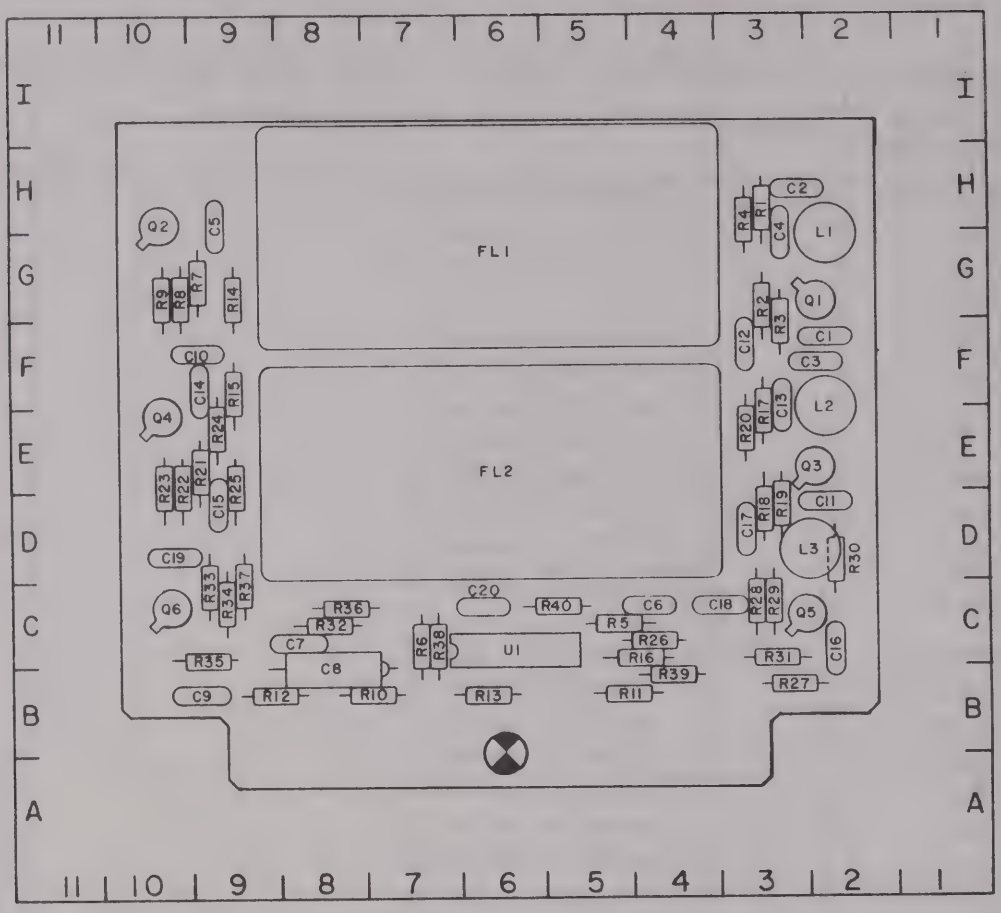
PARTS LOCATION INDEX
ASSEMBLY 1A4A2

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	3C	MP1	UNDER Q1
C2	3E	MP2	6F
C3	4D	Q1	5E
C4	5D	R1	3D
C5	4C	R2	4C
C6	5F	R3	4D
C7	5E	R4	4E
C8	7E	R5	4F
C9	7C	R6	4D
C10	6C	R7	4C
C11	5C	R8	7E
L1	5E	R9	6D
L2	6E	R10	6E
L3	6C	U1	8D
L4	6B		

Figure 7-13. 10.7 MHz/455 kHz Converter 71430-2 (1A4A2)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A3R3		RESISTOR: see item 49	7-14 (3G)
1A4A3R4		RESISTOR: see item 40	7-14 (3H)
1A4A3R5, 1A4A3R6		RESISTOR: see item 45	7-14 (5C, 7C)
1A4A3R7		RESISTOR: see item 41	7-14 (9G)
1A4A3R8		RESISTOR: see item 43	7-14 (10G)
1A4A3R9		RESISTOR: see item 42	7-14 (10G)
1A4A3R10		RESISTOR: see item 46	7-14 (7B)
1A4A3R11		RESISTOR: see item 45	7-14 (4B)
1A4A3R12		RESISTOR: see item 38	7-14 (8B)
1A4A3R13		RESISTOR: see item 48	7-14 (6B
1A4A3R14, 1A4A3R15		RESISTOR: see item 36	7-14 (9G, 9F)
1A4A3R16		RESISTOR: see item 38	7-14 (4C)
1A4A3R17		RESISTOR: see item 48	7-14 (3F)
1A4A3R18		RESISTOR: see item 52	7-14 (3D)
1A4A3R19		RESISTOR: see item 49	7-14 (3D)
1A4A3R20		RESISTOR: see item 40	7-14 (3E)
1A4A3R21		RESISTOR: see item 41	7-14 (9E)
1A4A3R22		RESISTOR: see item 43	7-14 (10E)
1A4A3R23		RESISTOR: see item 42	7-14 (10E)
1A4A3R24, 1A4A3R25		RESISTOR: see item 36	7-14 (9E)
1A4A3R26, 1A4A3R27		RESISTOR: see item 38	7-14 (4C, 3B)
1A4A3R28		RESISTOR: see item 48	7-14 (3C)
1A4A3R29		RESISTOR: see item 52	7-14 (3C)
1A4A3R30		RESISTOR: see item 40	7-14 (2D)
1A4A3R31		RESISTOR: see item 49	7-14 (3C)
1A4A3R32		RESISTOR: see item 46	7-14 (8C)
1A4A3R33		RESISTOR: see item 41	7-14 (9C)
1A4A3R34		RESISTOR: see item 43	7-14 (9C)
1A4A3R35		RESISTOR: see item 42	7-14 (9C)
1A4A3R36, 1A4A3R37		RESISTOR: see item 36	7-14 (8C, 9C)
1A4A3R38		RESISTOR: see item 56	7-14 (7C)
1A4A3R39		RESISTOR: see item 38	7-14 (4B)
1A4A3R40		RESISTOR: see item 36	7-14 (5C)
1A4A3U1		INTEGRATED CIRCUIT: see item 28	7-14 (6C)



PARTS LOCATION INDEX
ASSEMBLY 1A4A3

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	2F	FL1	6G	R3	3G	R23	10E
C2	3H	FL2	6E	R4	3H	R24	9E
C3	2F	L1	2H	R5	5C	R25	9E
C4	3H	L2	2F	R6	7C	R26	4C
C5	9H	L3	3D	R7	9G	R27	3B
C6	4C	MP1	UNDER Q1	R8	10G	R28	3C
C7	8C	MP2	UNDER Q2	R9	10G	R29	3C
C8	8B	MP3	UNDER Q3	R10	7B	R30	2D
C9	10B	MP4	UNDER Q4	R11	4B	R31	3C
C10	9F	MP5	UNDER Q5	R12	8B	R32	8C
C11	2D	MP6	UNDER Q6	R13	6B	R33	9C
C12	3F	MP7	6B	R14	9G	R34	9C
C13	3E	Q1	2G	R15	9F	R35	9C
C14	9F	Q2	10H	R16	4C	R36	8C
C15	9D	Q3	2E	R17	3F	R37	9C
C16	2C	Q4	10E	R18	3D	R38	7C
C17	3D	Q5	2C	R19	3D	R39	4B
C18	3C	Q6	10C	R20	3E	R40	5C
C19	10D	R1	3H	R21	9E	U1	6C
C20	6C	R2	3G	R22	10E		

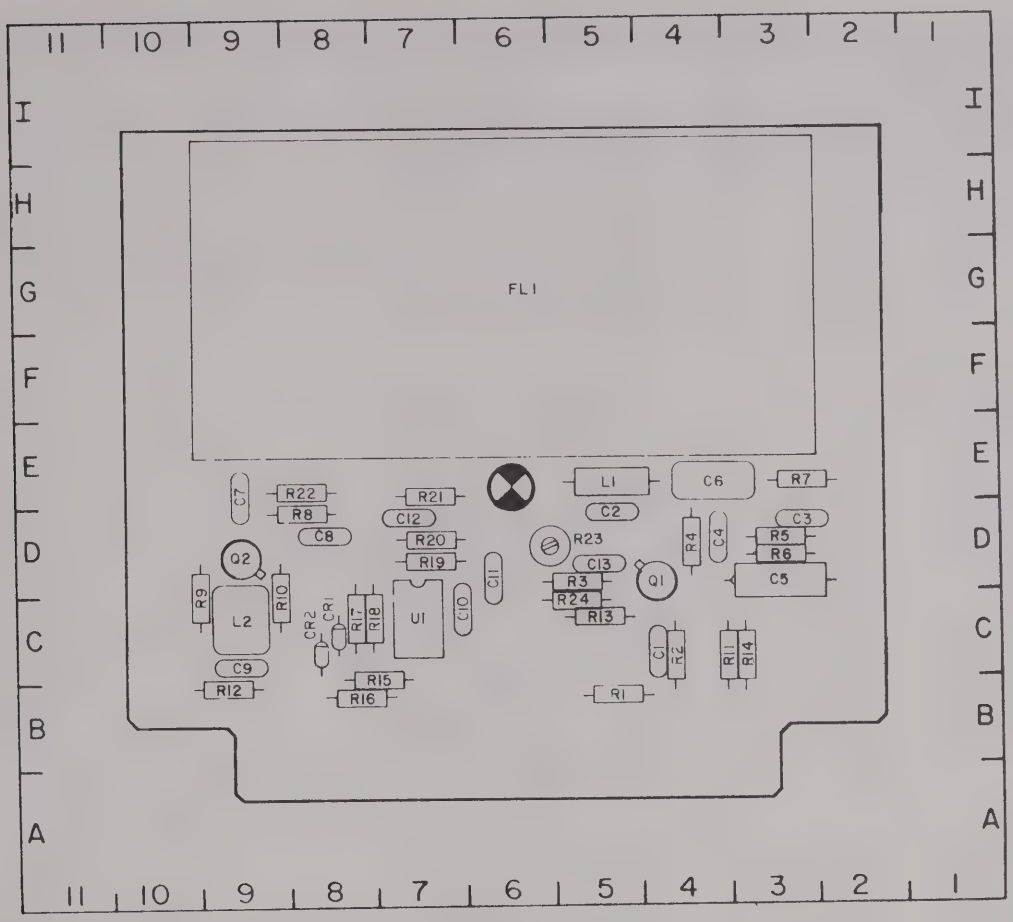
Figure 7-14. 455 kHz Filter Switch 791595-6 (1A4A3)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A4		CIRCUIT CARD ASSEMBLY: usb filter switch and circuit board, usb filter passes signals between 455.25 kHz and 458.2 kHz, and amplifies them with a net voltage gain of approximately 9 dB, 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr 14632, part no. 791596-3	7-2 Sh 2 (82)
1A4A4C1 Thru 1A4A4C4		CAPACITOR: see item 10	7-15 (4C, 5D, 3D, 4D)
1A4A4C5		CAPACITOR: see item 3	7-15 (3D)
1A4A4C6		CAPACITOR: see item 12	7-15 (4E)
1A4A4C7 Thru 1A4A4C13		CAPACITOR: see item 10	7-15 (9E, 8D, 9C, 7D, 6D, 7D, 5D)
1A4A4CR1, 1A4A4CR2		SEMICONDUCTOR: see item 61	7-15 (8C)
1A4A4FL1		FILTER-BAND PASS: upper side band 455 kHz, ultimate attenuation 60 dB, ripple 6 dB bandwidth, 3.52 in. long by 1.82 in. wide by .98 in. high, mfr 14632,part no. 92122	7-15 (6G)
1A4A4L1		COIL, RADIO, FREQUENCY: fixed molded, 1000 µH, 5 pct, min Q60, .190 in. dia by .440 in. long, .022 in. leads, mfr 99800, part no. 2500-28	7-15 (5E)
1A4A4L2		COIL: see item 15	7-15 (9C)
1A4A4MP1		INSULATOR: see item 24 (2)	7-15 (UNDER Q1)
1A4A4MP2		INSULATOR: same as 1A4A4MP1	7-15 (UNDER Q2)
1A4A4MP3		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A4, mfr 14632, part no. 791596-3	7-15 (6E)
1A4A4Q1, 1A4A4Q2		TRANSISTOR: see item 63	7-15 (5D, 9D)
1A4A4R1		RESISTOR: see item 38	7-15 (5B)
1A4A4R2		RESISTOR: see item 56	7-15 (4C)
1A4A4R3		RESISTOR: see item 49	7-15 (5D)
1A4A4R4		RESISTOR: see item 35	7-15 (4D)
1A4A4R5, 1A4A4R6		RESISTOR: see item 45	7-15 (3D)
1A4A4R7, 1A4A4R8		RESISTOR: see item 40	7-15 (3E, 8D)
1A4A4R9		RESISTOR: see item 35	7-15 (10C)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A4R10		RESISTOR: see item 36	7-15 (9C)
1A4A4R11		RESISTOR: see item 45	7-15 (4C)
1A4A4R12		RESISTOR: see item 38	7-15 (9B)
1A4A4R13		RESISTOR: see item 48	7-15 (5C)
1A4A4R14		RESISTOR: see item 36	7-15 (3C)
1A4A4R15, 1A4A4R16		RESISTOR: see item 38	7-15 (7B, 8B)
1A4A4R17		RESISTOR: see item 56	7-15 (8C)
1A4A4R18		RESISTOR: see item 53	7-15 (8C)
1A4A4R19, 1A4A4R20		RESISTOR: see item 36	7-15 (7D)
1A4A4R21		RESISTOR: see item 48	7-15 (7E)
1A4A4R22		RESISTOR: see item 52	7-15 (8E)
1A4A4R23		RESISTOR, VARIABLE: 500 ohms 10 pct, .5 w, helitrim, sealed metal housing, 1/4 in. dia single turn 3 pins, mfr 73138, part no. 62PR500	7-15 (6D)
1A4A4R24		RESISTOR: see item 36	7-15 (5C)
1A4A4U1		INTEGRATED CIRCUIT: same as 1A4A1U1	7-15 (7C)
1A4A5		CIRCUIT CARD ASSEMBLY: isb/lsb filter switch, circuit board, connects in parallel with the 455 kHz filter switch, 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into mother-board, mfr 14632, part no. 791597-3	7-2 Sh 2 (83)
1A4A5C1 Thru 1A4A5C4		CAPACITOR: see item 10	7-16 (4C, 5D, 3D, 4D)
1A4A5C5		CAPACITOR: see item 3	7-16 (3D)
1A4A5C6		CAPACITOR: see item 12	7-16 (4E)
1A4A5C7 Thru 1A4A5C17		CAPACITOR: see item 10	7-16 (7E, 8D, 3C, 7C, 6C, 6D, 10E, 9D, 9C, 5D)
1A4A5CR1 Thru 1A4A5CR3		SEMICONDUCTOR: see item 61	7-16 (6C, 8D, 7E)
1A4A5FL1		FILTER, LOW PASS: lower sideband 455 kHz, carrier rejection 12 dB min, ultimate attenuation 60 dB, 3.52 in. long by 1.82 in. wide by .98 in. high, mfr 14632, part no. 92121	7-16 (6G)
1A4A5L1		COIL: same as 1A4A4L1	7-16 (5E)
1A4A5L2, 1A4A5L3		COIL: see item 15	7-16 (8D, 9C)



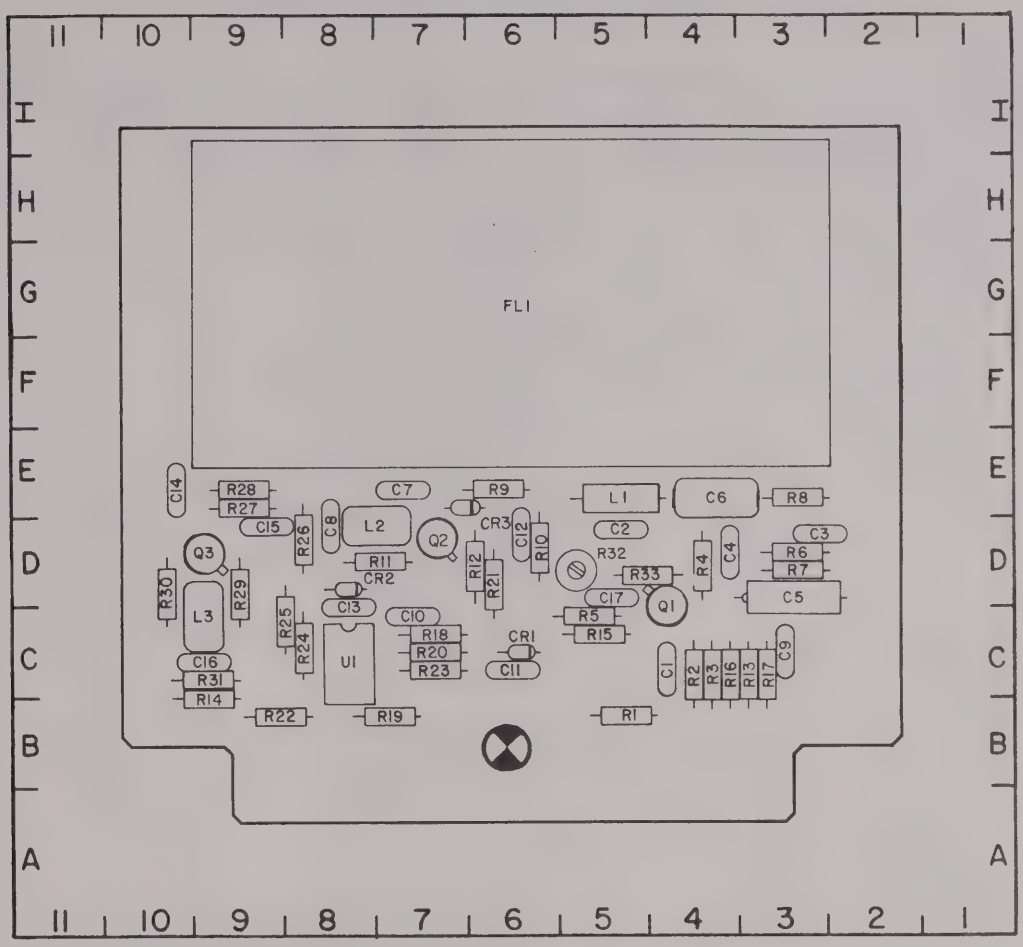
PARTS LOCATION INDEX
ASSEMBLY 1A4A4

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	4C	L1	5E	R10	9C
C2	5D	L2	9C	R11	4C
C3	3D	MP1	UNDER Q1	R12	9B
C4	4D	MP2	UNDER Q2	R13	5C
C5	3D	MP3	6E	R14	3C
C6	4E	Q1	4D	R15	7B
C7	9E	Q2	9D	R16	8B
C8	8D	R1	5B	R17	8C
C9	9C	R2	4C	R18	8C
C10	7D	R3	5D	R19	7D
C11	6D	R4	4D	R20	7D
C12	7D	R5	3D	R21	7E
C13	5D	R6	3D	R22	8E
CR1	8C	R7	3E	R23	6D
CR2	8C	R8	8D	R24	5C
FL1	6G	R9	10C	U1	7C

Figure 7-15. Usb Filter Switch 791596-3 (1A4A4)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A5MP1 Thru 1A4A5MP3		INSULATOR: see item 26	7-16 (UNDER Q1-Q2)
1A4A5MP4		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A5, mfr 14632, part no. 791597P1	7-16 (6B)
1A4A5Q1 Thru 1A4A5Q3		TRANSISTOR: see item 63	7-16 (4C, 7D, 9D)
1A4A5R1		RESISTOR: see item 38	7-16 (5B)
1A4A5R2		RESISTOR: see item 52	7-16 (4C)
1A4A5R3		RESISTOR: see item 37	7-16 (4C)
1A4A5R4		RESISTOR: see item 35	7-16 (4D)
1A4A5R5		RESISTOR: see item 49	7-16 (5C)
1A4A5R6, 1A4A5R7		RESISTOR: see item 45	7-16 (3D)
1A4A5R8		RESISTOR: see item 40	7-16 (3E)
1A4A5R9		RESISTOR, FIXED, COMPOSITION: 2.4 k ohms, 5 pct .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G242JS	7-16 (6E)
1A4A5R10		RESISTOR: see item 56	7-16 (6D)
1A4A5R11		RESISTOR: see item 35	7-16 (7D)
1A4A5R12		RESISTOR: see item 36	7-16 (6D)
1A4A5R13		RESISTOR: see item 45	7-16 (3C)
1A4A5R14		RESISTOR: see item 38	7-16 (9B)
1A4A5R15		RESISTOR: see item 44	7-16 (5C)
1A4A5R16		RESISTOR: see item 38	7-16 (4C)
1A4A5R17		RESISTOR: see item 45	7-16 (3C)
1A4A5R18		RESISTOR: see item 36	7-16 (7C)
1A4A5R19		RESISTOR: see item 38	7-16 (7B)
1A4A5R20		RESISTOR: see item 36	7-16 (7C)
1A4A5R21		RESISTOR: see item 48	7-16 (6D)
1A4A5R22		RESISTOR: see item 38	7-16 (9B)
1A4A5R23		RESISTOR: see item 56	7-16 (7C)
1A4A5R24		RESISTOR, FIXED, COMPOSITION: 24 k ohms, 5 pct .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G243JS	7-16 (8C)
1A4A5R25		RESISTOR: see item 36	7-16 (9C)
1A4A5R26		RESISTOR: see item 48	7-16 (8D)
1A4A5R27		RESISTOR: same as 1A4A5R9	7-16 (9E)



PARTS LOCATION INDEX
ASSEMBLY 1A4A5

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	4C	CR1	6C	R4	4D	R21	6D
C2	5D	CR2	8D	R5	5C	R22	9B
C3	3D	CR3	7E	R6	3D	R23	7C
C4	4D	FL1	6G	R7	3D	R24	8C
C5	3D	L1	5E	R8	3E	R25	9C
C6	4E	L2	8D	R9	6E	R26	8D
C7	7E	L3	9C	R10	6D	R27	9E
C8	8D	MP1	UNDER Q1	R11	7D	R28	9E
C9	3C	MP2	UNDER Q2	R12	6D	R29	9D
C10	7C	MP3	UNDER Q3	R13	3C	R30	10D
C11	6C	MP4	6B	R14	9B	R31	9C
C12	6D	Q1	4C	R15	5C	R32	5D
C13	8D	Q2	7D	R16	4C	R33	5D
C14	10E	Q3	9D	R17	3C	U1	8C
C15	9D	R1	5B	R18	7C		
C16	9C	R2	4C	R19	7B		
C17	5D	R3	4C	R20	7C		

Figure 7-16. Isb/Lsb Filter Switch 791597-3 (1A4A5)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

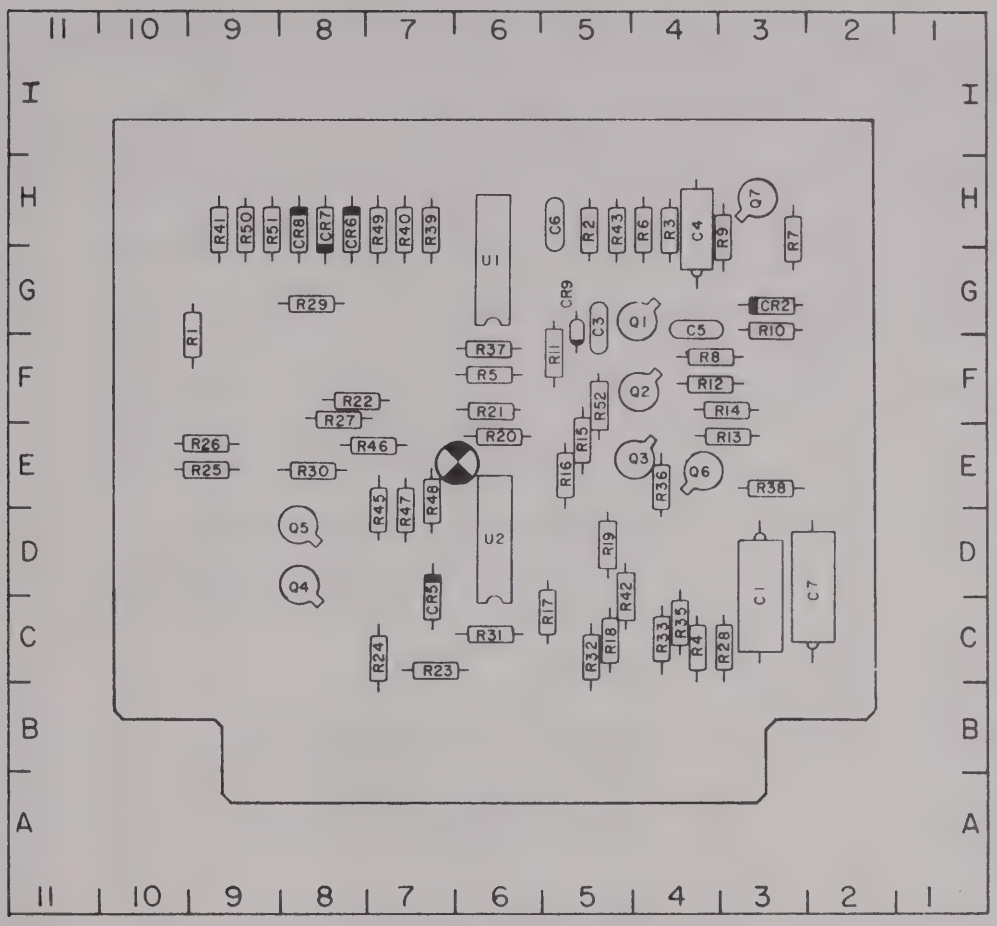
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A5R28		RESISTOR: see item 56	7-16 (9E)
1A4A5R29		RESISTOR: see item 36	7-16 (9D)
1A4A5R30		RESISTOR: see item 35	7-16 (10D)
1A4A5R31		RESISTOR: see item 38	7-16 (9C)
1A4A5R32		RESISTOR: same as 1A4A4R23	7-16 (5D)
1A4A5R33		RESISTOR: see item as 36	7-16 (5D)
1A4A5U1		INTEGRATED CIRCUIT: 1A4A1U1	7-16 (8C)
1A4A6		CIRCUIT CARD ASSEMBLY: agc amplifier, generates control voltages which adjust the amplification of signals passing through the receiver, 0.500 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into the motherboard, mfr 14632, part no. 78112-4	7-2b (69)
1A4A6C1		CAPACITORS, FIXED, ELECTROLYTIC: 47 µF, 10 pct, 20 v, mfr 81349, part no. CS13BE476K	7-17 (3D)
1A4A6C2		Not Used	
1A4A6C3		CAPACITOR: see item 10	7-17 (5G)
1A4A6C4		CAPACITOR, FIXED, ELECTROLYTIC: 33 µF, 10 pct, 10 v, mfr 81349, part no. CS13BC336K	7-17 (4H)
1A4A6C5		CAPACITOR: see item 10	7-17 (4G)
1A4A6C6		CAPACITOR: see item 12	7-17 (5H)
1A4A6C7		CAPACITOR: same as 1A4A6C1	7-17 (2D)
1A4A6CR1		Not Used	
1A4A6CR2		SEMICONDUCTOR DEVICE, DIODE: zener 5.6 v silicon, 400 mw, mfr 80131, part no. 1N752A	7-17 (3G)
1A4A6CR3		Not Used	
1A4A6CR4		Not Used	
1A4A6CR5 Thru 1A4A6CR9		SEMICONDUCTOR: see item 61	7-17 (7D, 8H, 5G)
1A4A6MP1 Thru 1A4A6MP7		INSULATOR: see item 26	7-17 (UNDER Q1-Q2)
1A4A6MP8		PRINTED WIRING BOARD: basic etched circuit less the assembled components for item 1A4A6, mfr 14632, part no. 78112P1	7-17 (7E)
1A4A6Q1		TRANSISTOR: see item 63	7-17 (4G)
1A4A6Q2		TRANSISTOR: see item 65	7-17 (4F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6Q3 Thru 1A4A6Q7		TRANSISTOR: see item 63	7-17 (4E, 8D, 3H)
1A4A6R1		RESISTOR: see item 39	7-17 (9G)
1A4A6R2		RESISTOR: see item 57	7-17 (5H)
1A4A6R3		RESISTOR, FIXED, COMPOSITION: 470 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G474JS	7-17 (4H)
1A4A6R4		RESISTOR: see item 36	7-17 (4C)
1A4A6R5		RESISTOR: see item 39	7-17 (6F)
1A4A6R6		RESISTOR, FIXED, COMPOSITION: 330 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G334JS	7-17 (4H)
1A4A6R7		RESISTOR: see item 59	7-17 (3H)
1A4A6R8		RESISTOR: see item 36	7-17 (4F)
1A4A6R9		RESISTOR: see item 44	7-17 (3H)
1A4A6R10		RESISTOR, FIXED, COMPOSITION: 150 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G154JS	7-17 (3G)
1A4A6R11		RESISTOR: see item 38	7-17 (5F)
1A4A6R12		RESISTOR, FIXED, COMPOSITION: 82 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G823JS	7-17 (4F)
1A4A6R13		RESISTOR: see item 37	7-17 (3E)
1A4A6R14		RESISTOR: see item 40	7-17 (3F)
1A4A6R15, 1A4A6R16		RESISTOR: see item 59	7-17 (5E)
1A4A6R17		RESISTOR: see item 48	7-17 (6C)
1A4A6R18		RESISTOR, FIXED, COMPOSITION: 270 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G274JS	7-17 (5C)
1A4A6R19		RESISTOR, FIXED, COMPOSITION: 680 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G684JS	7-17 (5D)
1A4A6R20		RESISTOR: see item 38	7-17 (6E)
1A4A6R21, 1A4A6R22		RESISTOR: see item 44	7-17 (6F, 8F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6R23		RESISTOR: same as 1A4A6R3	7-17 (7C)
1A4A6R24		RESISTOR: see item 44	7-17 (7C)
1A4A6R25		RESISTOR: see item 43	7-17 (9E)
1A4A6R26		RESISTOR: see item 47	7-17 (9E)
1A4A6R27		RESISTOR: see item 38	7-17 (8F)
1A4A6R28, 1A4A6R29		RESISTOR: see item 36	7-17 (3C, 8G)
1A4A6R30		RESISTOR: see item 38	7-17 (8E)
1A4A6R31		RESISTOR: see item 50	7-17 (6C)
1A4A6R32		RESISTOR: same as 1A3A2R14	7-17 (5C)
1A4A6R33		RESISTOR: see item 56	7-17 (4C)
1A4A6R34		Not Used	
1A4A6R35		RESISTOR: see item 56	7-17 (4C)
1A4A6R36		RESISTOR: see item 60	7-17 (4E)
1A4A6R37		RESISTOR: see item 39	7-17 (6F)
1A4A6R38, 1A4A6R39		RESISTOR: see item 60	7-17 (3E, 7H)
1A4A6R40		RESISTOR: see item 39	7-17 (7H)
1A4A6R41		RESISTOR: see item 59	7-17 (9H)
1A4A6R42		RESISTOR: see item 36	7-17 (5D)
1A4A6R43		RESISTOR: see item 57	7-17 (5H)
1A4A6R44		Not Used	
1A4A6R45		RESISTOR: same as 1A2A1R1	7-17 (7D)
1A4A6R46	Note 1	RESISTOR, FIXED, COMPOSITION: 36 k ohms 5 pct, .25 w, 250 v rated, 250 in. long body by .09 in. dia by .02 in. dia, mfr 81349, part no. RCR07G363JS	7-17 (8E)
1A4A6R46	Note 1	RESISTOR: see item 53	7-17 (8E)
1A4A6R46	Note 1	RESISTOR, FIXED, COMPOSITION: 43 k ohms 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. dia, mfr 81349, part no. RCR07G433JS	7-17 (8E)
1A4A6R47		RESISTOR, FIXED, COMPOSITION: 820 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G821JS	7-17 (7D)
1A4A6R48		RESISTOR: same as 1A3A2R13	7-17 (7D)
1A4A6R49		RESISTOR: same as 1A3A2R6	7-17 (7H)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	



PARTS LOCATION INDEX
ASSEMBLY 1A4A6

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	3D	Q1	4G	R14	3F	R35	4C
C3	5G	Q2	4F	R15	5E	R36	4E
C4	4H	Q3	4E	R16	5E	R37	6F
C5	4G	Q4	8D	R17	6C	R38	3E
C6	5H	Q5	8D	R18	5C	R39	7H
C7	2D	Q6	4E	R19	5D	R40	7H
CR2	3G	Q7	3H	R20	6E	R41	9H
CR5	7D	R1	9G	R21	6F	R42	5D
CR6	8H	R2	5H	R22	8F	R43	5H
CR7	8H	R3	4H	R23	7C	R45	7D
CR8	8H	R4	4C	R24	7C	R46	8E
CR9	5G	R5	6F	R25	9E	R47	7D
MP1	UNDER Q1	R6	4H	R26	9E	R48	7D
MP2	UNDER Q2	R7	3H	R27	8F	R49	7H
MP3	UNDER Q3	R8	4F	R28	3C	R50	9H
MP4	UNDER Q4	R9	3H	R29	8G	R51	9H
MP5	UNDER Q5	R10	3G	R30	8E	R52	5F
MP6	UNDER Q6	R11	5F	R31	6C	U1	6G
MP7	UNDER Q7	R12	4F	R32	5C	U2	6D
MP8	7E	R13	3E	R33	4C		

Figure 7-17. Age Amplifier 78112-4 (1A4A6)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

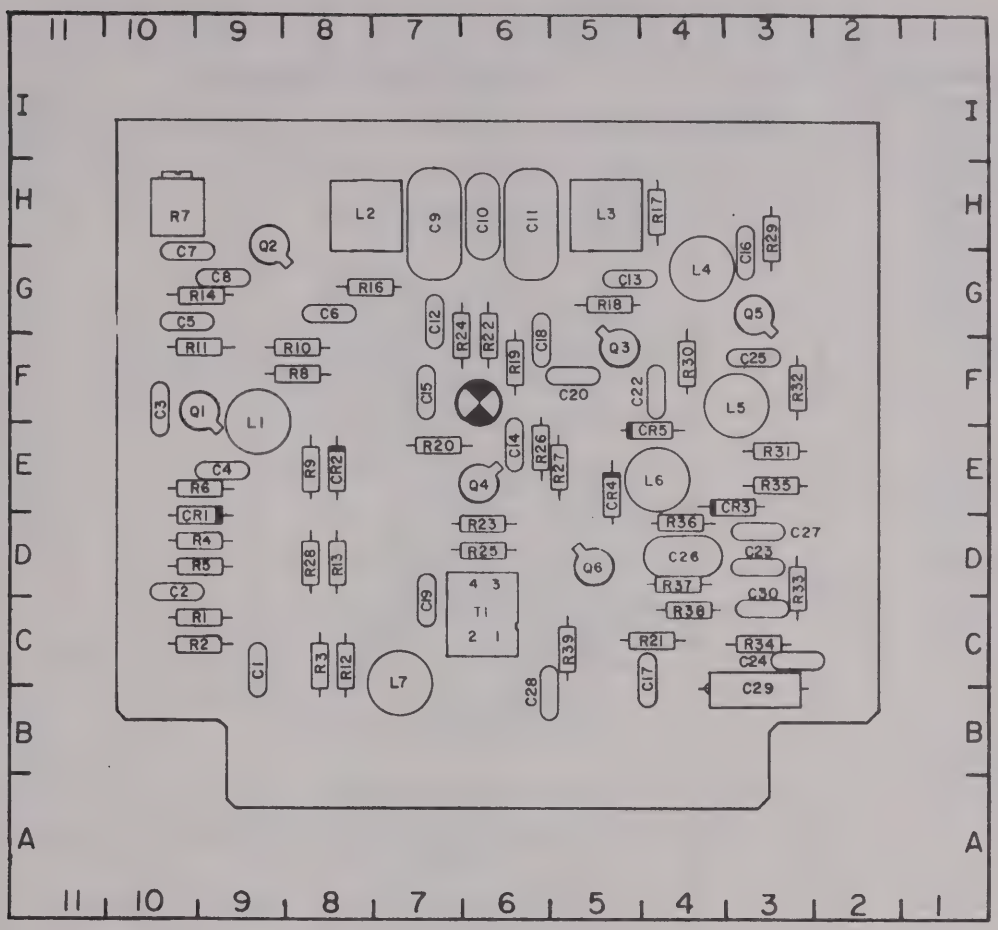
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6R50	Note 1	RESISTOR, FIXED, COMPOSITION: 3.6 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G362JS	7-17 (9H)
1A4A6R50	Note 1	RESISTOR: see item 52	7-17 (9H)
1A4A6R50	Note 1	RESISTOR, FIXED, COMPOSITION: 4.3 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G432JS	7-17 (9H)
1A4A6R51	Note 1	RESISTOR, FIXED, COMPOSITION: 360 ohms, 5 pct, .25 w, 250 v rated, 250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G361JS	7-17 (9H)
1A4A6R51	Note 1	RESISTOR: same as 1A3A2R14	7-17 (9H)
1A4A6R51	Note 1	RESISTOR, FIXED, COMPOSITION: 430 ohms, 5 pct, .25 W, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G431JS	7-17 (9H)
1A4A6R52		RESISTOR: see item 37	7-17 (5F)
1A4A6U1		INTEGRATED CIRCUIT: see item 28	7-17 (72)
1A4A6U2		INTEGRATED CIRCUIT: see item 28	7-17 (73)
1A4A7		CIRCUIT CARD ASSEMBLY: amplifier and am. detector, 455 kHz, circuit board, amplifies the weak signals in the receiver and splits the input signal to provide 3 outputs, 0.500 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into mother-board, mfr 14632, part no. 72488-3	7-2 Sh 2 (68)
1A4A7C1, 1A4A7C2		CAPACITOR: see item 10	7-18 (9C, 10D)
1A4A7C3		CAPACITOR: see item 11	7-18 (10F)
1A4A7C4		Not Used	
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7C5, 1A4A7C6		CAPACITOR: see item 10	7-18 (10G, 8G)
1A4A7C7		CAPACITOR: see item 11	7-18 (10G)
1A4A7C8		CAPACITOR: see item 10	7-18 (9G)
1A4A7C9		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3300 pF, 2 pct, 500 v, mfr 81349, part no. CM06FD332G03	7-18 (7H)
1A4A7C10		CAPACITOR: see item 11	7-18 (6H)
1A4A7C11		CAPACITOR: same as 1A4A7C9	7-18 (6H)
1A4A7C12 Thru 1A4A7C20		CAPACITOR: see item 10	7-18 (7G, 5G, 6E, 7F, 3G, 4B, 6F, 7C, 5F)
1A4A7C21		Not Used	
1A4A7C22 Thru 1A4A7C25		CAPACITOR: see item 10	7-18 (4F, 3D, 3C, 3F)
1A4A7C26		CAPACITOR: same as 1A2A1C4	7-18 (4D)
1A4A7C27		CAPACITOR: see item 10	7-18 (3D)
1A4A7C28		CAPACITOR: same as 1A3A2C4	7-18 (6B)
1A4A7C29		CAPACITOR: see item 3	7-18 (3B)
1A4A7C30		CAPACITOR: see item 10	7-18 (3C)
1A4A7CR1 Thru 1A4A7CR5		SEMICONDUCTOR: see item 61	7-18 (9D, 8E, 3E, 5E, 4F)
1A4A7L1		COIL: see item 15	7-18 (9F)
1A4A7L2		COIL, RADIO FREQUENCY: variable 35.1, -42.9 µH, .480 in. high by .400 in. sq, .050 mounting tabs, pc mount, metal shielded, mfr 71279, part no. 558-7107-32	7-18 (8H)
1A4A7L3		COIL: same as 1A4A7L2	7-18 (5H)
1A4A7L4 Thru 1A4A7L7		COIL: see item 15	7-18 (4G, 3F, 4E, 7C)
1A4A7MP1 Thru 1A4A7MP6		INSULATOR: see item 24 (6)	7-18 (UNDER Q1-Q7)
1A4A7MP7		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A7, mfr 14632, part no. 72488P1	7-18 (6F)
1A4A7Q1, 1A4A7Q2		TRANSISTOR: see item 67	7-18 (9F, 9H)
1A4A7Q3 Thru 1A4A7Q6		TRANSISTOR: see item 63	7-18 (5F, 6E, 5D)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7R1		RESISTOR: same as 1A4A1R52	7-18 (10C)
1A4A7R2		RESISTOR: see item 47	7-18 (10C)
1A4A7R3		RESISTOR: see item 52	7-18 (8C)
1A4A7R4		RESISTOR: see item 53	7-18 (10D)
1A4A7R5		RESISTOR, FIXED, COMPOSITION: 120 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G124JS	7-18 (10D)
1A4A7R6		RESISTOR: see item 49	7-18 (10E)
1A4A7R7		RESISTOR, VARIABLE: 5 k ohms, 10 pct, .5 w, helitrim, sealed metal housing 1/4 in. dia single turn, 3 pins, mfr 73138, part no. 62PAR5K	7-18 (10H)
1A4A7R8		RESISTOR: see item 46	7-18 (8F)
1A4A7R9		RESISTOR: see item 36	7-18 (8E)
1A4A7R10		RESISTOR, FIXED, COMPOSITION: 680 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G684JS	7-18 (8F)
1A4A7R11		RESISTOR: see item 57	7-18 (10F)
1A4A7R12		RESISTOR: see item 52	7-18 (8C)
1A4A7R13		RESISTOR: see item 53	7-18 (8D)
1A4A7R14		RESISTOR: see item 49	7-18 (10G)
1A4A7R15		Not Used	
1A4A7R16		RESISTOR: see item 54	7-18 (8G)
1A4A7R17		RESISTOR, FIXED, COMPOSITION: 8.2 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G822JS	7-18 (4H)
1A4A7R18		RESISTOR: see item 36	7-18 (5G)
1A4A7R19		RESISTOR: see item 36	7-18 (6F)
1A4A7R20		RESISTOR: same as 1A3A2R6	7-18 (7E)
1A4A7R21		RESISTOR: see item 36	7-18 (4C)
1A4A7R22		RESISTOR: see item 41	7-18 (6G)
1A4A7R23		RESISTOR: see item 56	7-18 (6D)
1A4A7R24		RESISTOR: see item 45	7-18 (7G)
1A4A7R25		RESISTOR: see item 55	7-18 (6D)
1A4A7R26		RESISTOR: same as 1A3A2R23	7-18 (6E)
1A4A7R27		RESISTOR: see item 42	7-18 (5E)
1A4A7R28		RESISTOR: same as 1A4A7R5	7-18 (8D)
1A4A7R29		RESISTOR: see item 43	7-18 (3H)



PARTS LOCATION INDEX
ASSEMBLY 1A4A7

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	9C	C26	4D	MP7	6F	R18	5G
C2	10D	C27	3D	Q1	9F	R19	6F
C3	10F	C28	6B	Q2	9H	R20	7E
C5	10G	C29	3B	Q3	5F	R21	4C
C6	8G	C30	3C	Q4	6E	R22	6G
C7	10G	CR1	9D	Q5	3G	R23	6D
C8	9G	CR2	8E	Q6	5D	R24	7G
C9	7H	CR3	3E	R1	10C	R25	6D
C10	6H	CR4	5E	R2	10C	R26	6E
C11	6H	CR5	4F	R3	8C	R27	6E
C12	7G	L1	9F	R4	10D	R28	8D
C13	5G	L2	8H	R5	10D	R29	3H
C14	6E	L3	5H	R6	10E	R30	4F
C15	7F	L4	4G	R7	10H	R31	3E
C16	3G	L5	3F	R8	8F	R32	3F
C17	4B	L6	4E	R9	8E	R33	3D
C18	6F	L7	7C	R10	8F	R34	3C
C19	7C	MP1	UNDER Q1	R11	10F	R35	3E
C20	5F	MP2	UNDER Q2	R12	8C	R36	4D
C22	4F	MP3	UNDER Q3	R13	8D	R37	4D
C23	3D	MP4	UNDER Q4	R14	10G	R38	4C
C24	3C	MP5	UNDER Q5	R16	8G	R39	5C
C25	3F	MP6	UNDER Q6	R17	4H	T1	6C

Figure 7-18. 455 kHz Amplifier and Am. Detector 72488-3 (1A4A7)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2. Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7R30		RESISTOR: see item 47	7-18 (4F)
1A4A7R31		RESISTOR: see item 36	7-18 (3E)
1A4A7R32		RESISTOR: see item 46	7-18 (3F)
1A4A7R33		RESISTOR: same as 1A3A2R4	7-18 (3D)
1A4A7R34		RESISTOR: see item 36	7-18 (3C)
1A4A7R35		RESISTOR, FIXED, COMPOSITION: 5.6 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G562JS	7-18 (3E)
1A4A7R36		RESISTOR: see item 57	7-18 (4D)
1A4A7R37		RESISTOR: see item 54	7-18 (4D)
1A4A7R38		RESISTOR: see item 59	7-18 (4C)
1A4A7R39		RESISTOR: see item 58	7-18 (5C)
1A4A7T1		TRANSFORMER: 70 kHz - 3.6 MHz freq range, porm 2.0 dB response, 4500-ohm source, 500-ohm load, 6 wire leads, .385 in. wide by .510 in. long by .385 in. high, mfr 06978, part no. 70-130	7-18 (6C)
1A4A8		CIRCUIT CARD ASSEMBLY: isb detector and audio, circuit board, processes the two demodulated ssb signals which share the same carrier frequency, 0.50 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr 14632, part no. 791598-2	7-2 Sh 2 (67)
1A4A8C1 Thru 1A4A8C3		CAPACITOR: see item 10	7-19 (9C, 10D, 9G)
1A4A8C4		Not Used	
1A4A8C5 Thru 1A4A8C11		CAPACITOR: see item 10	7-19 (9H, 8D, 9E, 8C, 7E, 3F)
1A4A8C12, 1A4A8C13		CAPACITOR: see item 3	7-19 (3G, 4C)
1A4A8C14 Thru 1A4A8C17		CAPACITOR: see item 10	7-19 (5C, 5B, 5D)
1A4A8C18		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3300 pF, 10 pct, 200 v, .09 in. thick by .290 in. wide by .290 in. long with 2 wire leads, mfr 81349, part no. CK06BX332K	7-19 (6G)
1A4A8C19		CAPACITOR, FIXED, ELECTROLYTIC: 4.7 µF, 10 pct, 35 v, axial leads, mfr 81349, part no. CS13BF475K	7-19 (3D)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

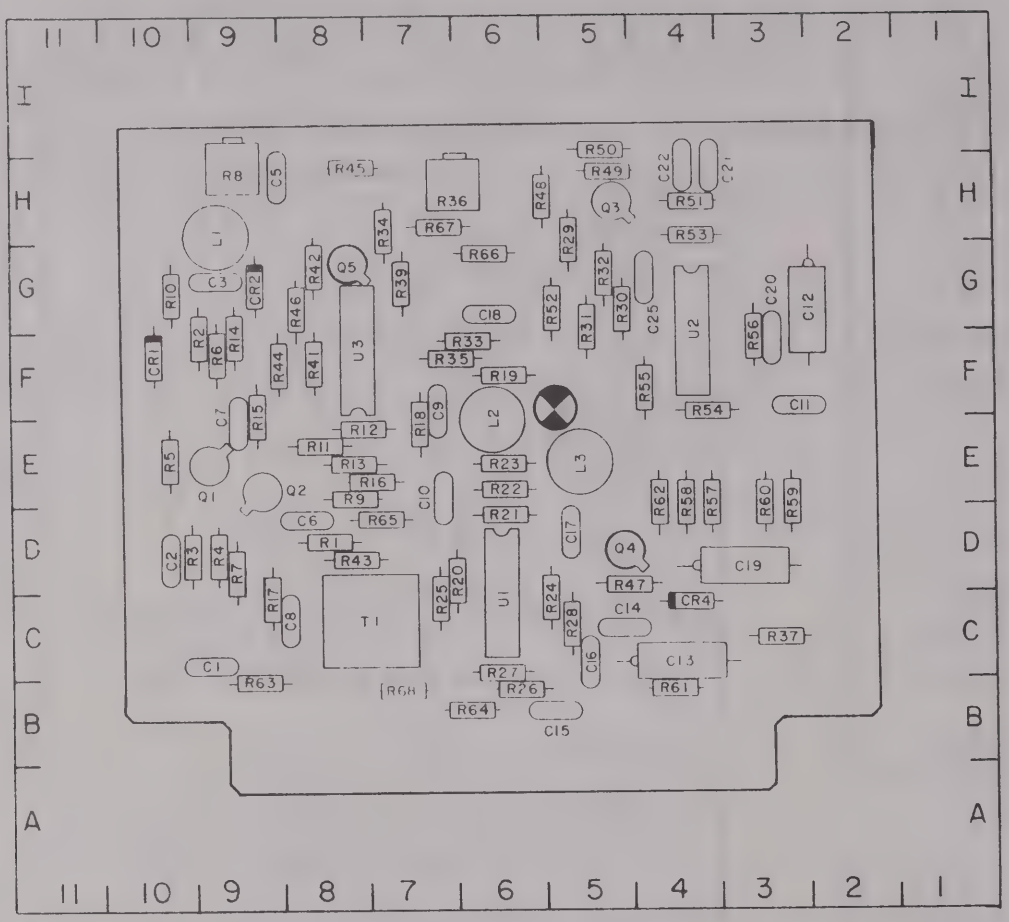
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8C20 Thru 1A4A8C22		CAPACITOR: see item 10	7-19 (3F, 4H)
1A4A8C23		Not Used	
1A4A8C24		Not Used	
1A4A8C25		CAPACITOR: see item 10	7-19 (4G)
1A4A8CR1, 1A4A8CR2		SEMICONDUCTOR: see item 61	7-19 (10F, 9G)
1A4A8CR3		Not Used	
1A4A8CR4		SEMICONDUCTOR: see item 61	7-19 (4C)
1A4A8L1, 1A4A8L2		COIL: see item 15	7-19 (9H, 6E)
1A4A8L3		COIL, RADIO FREQUENCY: 47 µH, 10 pct pc mount, .375 in. dia by .375 in. wide, .025 in. dia tinned leads, mfr 71279, part no. 553-3635-57	7-19 (5E)
1A4A8MP1 Thru 1A4A8MP5		INSULATOR: see item 26	7-19 (UNDER Q1-Q5)
1A4A8MP6		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A8, mfr 14632, part no. 791598P1	7-19 (5F)
1A4A8Q1, 1A4A8Q2		TRANSISTOR: see item 67	7-19 (9E)
1A4A8Q3		TRANSISTOR: see item 65	7-19 (5H)
1A4A8Q4		TRANSISTOR: see item 63	7-19 (5D)
1A4A8Q5		TRANSISTOR: see item 65	7-19 (8G)
1A4A8R1		RESISTOR: see item 52	7-19 (8D)
1A4A8R2		RESISTOR: same as 1A4A7R5	7-19 (9F)
1A4A8R3		RESISTOR: same as 1A4A1R52	7-19 (10D)
1A4A8R4		RESISTOR: see item 47	7-19 (9D)
1A4A8R5		RESISTOR: see item 53	7-19 (10E)
1A4A8R6		RESISTOR: see item 35	7-19 (9F)
1A4A8R7		RESISTOR: see item 49	7-19 (9D)
1A4A8R8		RESISTOR: same as 1A4A7R7	7-19 (9H)
1A4A8R9		RESISTOR: see item 54	7-19 (8E)
1A4A8R10		RESISTOR: see item 49	7-19 (10G)
1A4A8R11		RESISTOR: see item 52	7-19 (8E)
1A4A8R12		RESISTOR: same as 1A4A7R5	7-19 (8E)
1A4A8R13		RESISTOR: same as 1A4A7R10	7-19 (8E)
1A4A8R14		RESISTOR: see item 57	7-19 (9F)
1A4A8R15		RESISTOR: see item 53	7-19 (9E)
1A4A8R16		RESISTOR: see item 35	7-19 (7E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8R17		RESISTOR: see item 49	7-19 (9C)
1A4A8R18	Note 1	RESISTOR, FIXED, COMPOSITION: 2.0 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G202JS	7-19 (7E)
1A4A8R18	Note 1	RESISTOR: see item 47	7-19 (7E)
1A4A8R18	Note 1	RESISTOR, FIXED, COMPOSITION: 2.0 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G242JS	7-19 (7E)
1A4A8R19		RESISTOR: see item 45	7-19 (6F)
1A4A8R20		RESISTOR: see item 59	7-19 (7D)
1A4A8R21, 1A4A8R22		RESISTOR: see item 38	7-19 (6D, 6E)
1A4A8R23		RESISTOR: see item 59	7-19 (6E)
1A4A8R24, 1A4A8R25		RESISTOR: see item 37	7-19 (5C, 7C)
1A4A8R26		RESISTOR: see item 44	7-19 (6B)
1A4A8R27, 1A4A8R28		RESISTOR: see item 52	7-19 (6C, 5C)
1A4A8R29		RESISTOR: see item 57	7-19 (5H)
1A4A8R30		RESISTOR: see item 47	7-19 (5G)
1A4A8R31		RESISTOR: same as 1A4A6R6	7-19 (5G)
1A4A8R32		RESISTOR: see item 57	7-19 (5G)
1A4A8R33		RESISTOR: see item 41	7-19 (6F)
1A4A8R34		RESISTOR, FIXED, COMPOSITION: 12 k ohms, 5 pct, 25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G105JS	7-19 (7H)
1A4A8R35		RESISTOR: same as 1A4A8R34	7-19 (7F)
1A4A8R36		RESISTOR, VARIABLE: 25 k ohms, 10 pct, .50 w, helitrim, sealed metal housing 1/4 in. dia single turn, 3 pins, mfr 73138, part no. 62PAR25K	7-19 (7H)
1A4A8R37		RESISTOR: see item 45	7-19 (3C)
1A4A8R38		Not Used	
1A4A8R39		RESISTOR: see item 57	7-19 (7G)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8R40		Not Used	
1A4A8R41		RESISTOR: see item 38	7-19 (8F)
1A4A8R42		RESISTOR: see item 44	7-19 (8G)
1A4A8R43		RESISTOR: see item 36	7-19 (8D)
1A4A8R44		RESISTOR: same as 1A4A7R10	7-19 (8F)
1A4A8R45		RESISTOR: see item 44	7-19 (8H)
1A4A8R46		RESISTOR: see item 48	7-19 (8G)
1A4A8R47		RESISTOR: see item 56	7-19 (5C)
1A4A8R48		RESISTOR: same as 1A4A6R12	7-19 (6H)
1A4A8R49		RESISTOR: see item 37	7-19 (5H)
1A4A8R50		RESISTOR: see item 40	7-19 (5H)
1A4A8R51		RESISTOR: see item 38	7-19 (4H)
1A4A8R52		RESISTOR, FIXED, COMPOSITION: 3.3 m ohms, 5 pct, .25 w, 250 v rated, .250 in. long by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G335JS	7-19 (5G)
1A4A8R53		RESISTOR: same as 1A4A1R52	7-19 (4H)
1A4A8R54		RESISTOR, FIXED, FILM: 18.2 k ohms, 1 pct, .10 w, 200 v rated, .250 in. long body by .088 in. dia by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C1822F	7-19 (4F)
1A4A8R55		RESISTOR, FIXED, FILM: 82.5 k ohms, 1 pct, .10 w 200 v rated, .250 in. long body by .088 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C8252F	7-19 (4F)
1A4A8R56		RESISTOR, FIXED, FILM: 100 k ohms, 1 pct, .10 w, 200 v rated, .250 in. long body by .02 in. lead dia, mfr 81349, part no. RN55C1003F	7-19 (3G)
1A4A8R57		RESISTOR: see item 38	7-19 (4E)
1A4A8R58, 1A4A8R59		RESISTOR: see item 42	7-19 (4E, 3E)
1A4A8R60		RESISTOR: see item 38	7-19 (3E)
1A4A8R61		RESISTOR: see item 45	7-19 (4B)
1A4A8R62		RESISTOR: see item 37	7-19 (4E)
1A4A8R63		RESISTOR: see item 46	7-19 (9B)
1A4A8R64		RESISTOR: see item 48	7-19 (6B)
1A4A8R65		RESISTOR: see item 36	7-19 (7D)
1A4A8R66		RESISTOR: see item 60	7-19 (6G)
1A4A8R67		RESISTOR: see item 48	7-19 (7H)
1A4A8R68		RESISTOR: see item 56	7-19 (7B)



PARTS LOCATION INDEX
ASSEMBLY 1A4A8

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	9C	MP1	UNDER Q1	R18	7E	R48	6H
C2	10D	MP2	UNDER Q2	R19	6F	R49	5H
C3	9G	MP3	UNDER Q3	R20	7D	R50	5H
C5	9H	MP4	UNDER Q4	R21	6D	R51	4H
C6	8D	MP5	UNDER Q5	R22	6E	R52	5G
C7	9E	MP6	5F	R23	6E	R53	4H
C8	8C	Q1	9E	R24	5C	R54	4F
C9	7E	Q2	9E	R25	7C	R55	4F
C10	7E	Q3	5H	R26	6B	R56	3G
C11	3F	Q4	5D	R27	6C	R57	4E
C12	3G	Q5	8G	R28	5C	R58	4E
C13	4C	R1	8D	R29	5H	R59	3E
C14	5C	R2	9F	R30	5G	R60	3E
C15	5B	R3	10D	R31	5G	R61	4B
C16	5C	R4	9D	R32	5G	R62	4E
C17	5D	R5	10E	R33	6F	R63	9H
C18	6G	R6	9F	R34	7H	R64	6B
C19	3D	R7	9D	R35	7F	R65	7D
C20	3F	R8	9H	R36	7H	R66	6G
C21	4H	R9	8E	R37	3C	R67	7H
C22	4H	R10	10G	R39	7G	R68	7B
C25	4G	R11	8E	R41	8F	T1	8C
CR1	10F	R12	8E	R42	8G	U1	6C
CR2	9G	R13	8E	R43	8D	U2	4G
CR4	4C	R14	9F	R44	8F	U3	8F
L1	9H	R15	9E	R45	8H		
L2	6E	R16	7E	R46	8G		
L3	5E	R17	9C	R47	5C		

Figure 7-19. Isb Detection and Audio 791598-2 (1A4A8)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8T1		TRANSFORMER, AUDIO FREQUENCY: 600-ohm ct to 600-ohm ct, dc resistance 65-ohm PR1 75-ohm sec, max PR1 dc 4 mA, max 200 Hz power 150 mW, response ±1 dB 200 to 50 kHz, distortion 10 pct, max rated power 200 to 50 kHz, 6 lead pc mount, .600 in. high by .590 in. wide and .590 in. deep, mfr 07388, part no. LL010	7-19 (8C)
1A4A8U1		INTEGRATED CIRCUIT: balanced modulator/demodulator, silicon monolithic, plastic dip 14 pin pc mount, mfr 04713, part no. MC1496P	7-19 (6C)
1A4A8U2, 1A4A8U3		INTEGRATED CIRCUIT: see item 28	7-19 (4G, 8F)
1A4A9		CIRCUIT CARD ASSEMBLY: fm/cw/ssb detector, circuit board, contains a limiter and discriminator, powered when fm detection is selected for cw or ssb, a product detector has its power applied when cw, usb, lsb or isb detection modes are selected, 0.05 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr 14632, part no. 791599-3	7-2 Sh 2 (66)
1A4A9C1 Thru 1A4A9C5		CAPACITOR: see item 10	7-20 (4E, 3E, 4F, 2E, 2F)
1A4A9C6		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 470 pF, 2 pct, 500 v, mfr 72136, part no. DM 15-471G	7-20 (4G)
1A4A9C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 330 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD331G03	7-20 (4G)
1A4A9C8		CAPACITOR, FIXED CERAMIC DIELECTRIC: 390 pF, 2 pct, 500 v, mfr 81349, part no. CM05FD391G03	7-20 (6G)
1A4A9C9		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 150 pF, 5 pct, 50 v TC-N750, .320 in. sq, mfr 93958, part no. 1U150RJ	7-20 (6H)
1A4A9C10		CAPACITOR: same as 1A4A9C7	7-20 (6F)
1A4A9C11		CAPACITOR, FIXED, PLASTIC DIELECTRIC: .015 µF, 5 pct, 100 v, .187 in. dia by .50 in. long, mfr 84411, part no. 663UW153-5-1W	7-20 (7H)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2. Parts List-Continued

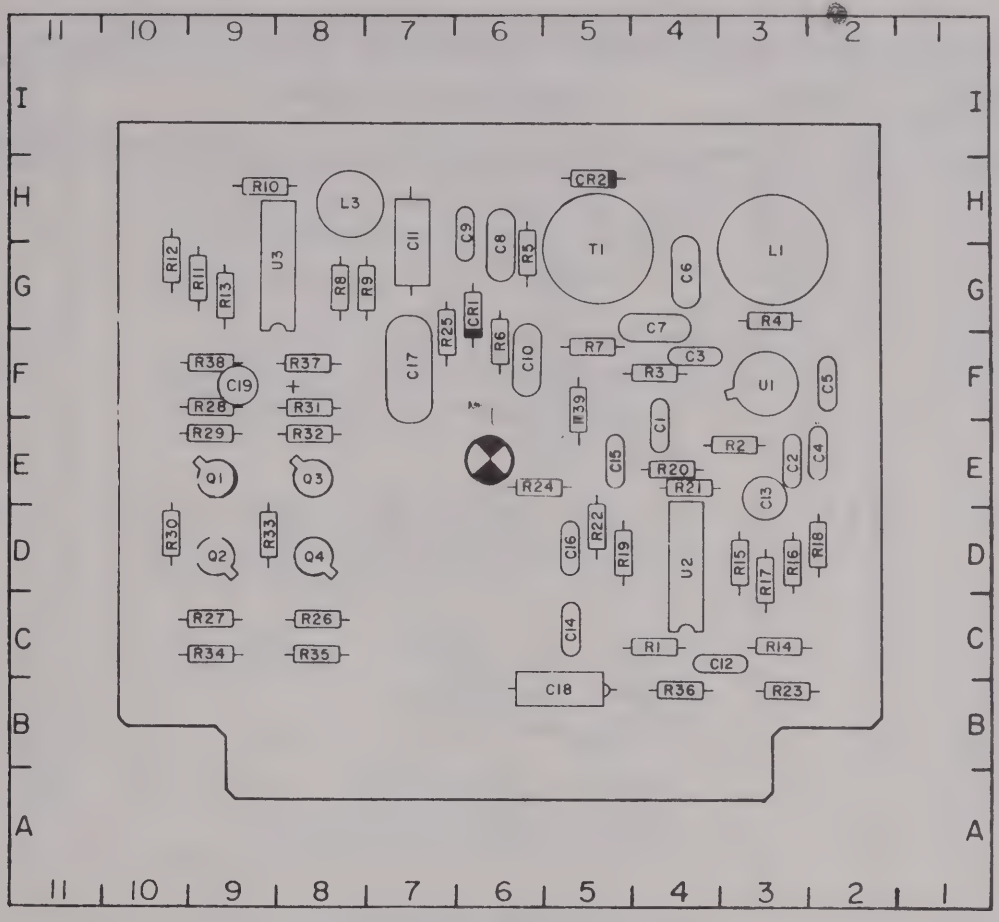
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9C12		CAPACITOR: see item 10	7-20 (4C)
1A4A9C13		CAPACITOR, FIXED, ELECTROLYTIC: 18 µF, 10 pct, 20 v, epoxy dipped, solid tantalum .225 in. x .425 in., mfr 56289, part no. 196D186X9020KE3	7-20 (3E)
1A4A9C14, 1A4A9C15		CAPACITOR: see item 10	7-20 (5C, 5E)
1A4A9C16		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1 µF, 20 pct, 50 v, monobloc, .300 in. x .300 in. sq, mfr 72982, part no. 8131-050-651-105M	7-20 (5D)
1A4A9C17		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2700 pF, 2 pct, 500 v, mfr 81349, part no. CM06FD272G03	7-20 (7F)
1A4A9C18		CAPACITOR: see item 3	7-20 (5B)
1A4A9C19		CAPACITOR: same as 1A3A2C18	7-20 (9F)
1A4A9CR1, 1A4A9CR2		SEMICONDUCTOR: see item 61	7-20 (6G, 5H)
1A4A9L1		COIL, RADIO, FREQUENCY: variable, 210 µH ±5 pct, mounting assy with bobbin, core, and trimmer, mfr 14632, part no. 30312-258	7-20 (3G)
1A4A9L2		Not Used	
1A4A9L3		COIL: same as 1A4A8L3	7-20 (8H)
1A4A9MP1 Thru 1A4A9MP4		INSULATOR, DISK: 3 lead .13 in. thk, T0-18 conv T0-5, mfr 13103, part no. 7717-115DAP	7-20 (UNDER Q1-Q4)
1A4A9MP5		PRINTED WIRING BOARD: basic etched circuit less assembled parts for item 1A4A9, mfr 14632, part no. 791599P1	7-20 (6E)
1A4A9Q1		TRANSISTOR: see item 65	7-20 (9E)
1A4A9Q2		TRANSISTOR: see item 63	7-20 (9D)
1A4A9Q3		TRANSISTOR: see item 65	7-20 (8E)
1A4A9Q4		TRANSISTOR: see item 63	7-20 (8D)
1A4A9R1		RESISTOR: see item 38	7-20 (4C)
1A4A9R2		RESISTOR: see item 37	7-20 (3E)
1A4A9R3		RESISTOR: see item 46	7-20 (4F)
1A4A9R4		RESISTOR: see item 54	7-20 (3G)
1A4A9R5		RESISTOR: see item 60	7-20 (6G)
1A4A9R6		RESISTOR: see item 57	7-20 (6F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9R7		RESISTOR, FIXED, COMPOSITION: 56 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G563JS	7-20 (5F)
1A4A9R8		RESISTOR: see item 56	7-20 (8G)
1A4A9R9		RESISTOR: see item 47	7-20 (8G)
1A4A9R10		RESISTOR, FIXED, COMPOSITION: 560 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G564JS	7-20 (9H)
1A4A9R11		RESISTOR: same as 1A4A6R3	7-20 (9G)
1A4A9R12, 1A4A9R13		RESISTOR: see item 44	7-20 (10G, 9G)
1A4A9R14		RESISTOR: see item 59	7-20 (3C)
1A4A9R15, 1A4A9R16		RESISTOR: see item 38	7-20 (3D)
1A4A9R17		RESISTOR: see item 59	7-20 (3D)
1A4A9R18, 1A4A9R19		RESISTOR: see item 37	7-20 (2D, 5D)
1A4A9R20		RESISTOR: see item 44	7-20 (4E)
1A4A9R21, 1A4A9R22		RESISTOR: see item 52	7-20 (4E, 5D)
1A4A9R23		RESISTOR: see item 36	7-20 (3B)
1A4A9R24		RESISTOR: see item 42	7-20 (6E)
1A4A9R25		RESISTOR: same as 1A4A7R35	7-20 (7F)
1A4A9R26		RESISTOR: see item 60	7-20 (8C)
1A4A9R27		RESISTOR: see item 57	7-20 (9C)
1A4A9R28		RESISTOR: see item 54	7-20 (9F)
1A4A9R29		RESISTOR: same as 1A4A6R12	7-20 (9E)
1A4A9R30		RESISTOR: see item 59	7-20 (10D)
1A4A9R31		RESISTOR: see item 54	7-20 (8F)
1A4A9R32		RESISTOR: same as 1A4A6R12	7-20 (8E)
1A4A9R33		RESISTOR: see item 59	7-20 (9D)
1A4A9R34		RESISTOR: see item 57	7-20 (9C)
1A4A9R35		RESISTOR: see item 60	7-20 (8C)
1A4A9R36		RESISTOR: see item 36	7-20 (4B)
1A4A9R37		RESISTOR: see item 56	7-20 (8F)
1A4A9R38		RESISTOR: see item 38	7-20 (9F)
1A4A9R39		RESISTOR: see item 55	7-20 (5F)
1A4A9T1		COIL, RADIO FREQUENCY: variable, 215 μH ±5 pct sec, mounting assy with bobbin, core and trimmer, mfr 14632, part no. 30312-257	7-20 (5G)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9U1		INTEGRATED CIRCUIT: fm if. amplifier, hi g-gain wideband, hermetic 10 lead to 5 package, mfr 02735. part no. CA3012	7-20 (3F)
1A4A9U2		INTEGRATED CIRCUIT: same as 1A4A8U1	7-20 (4D)
1A4A9U3		INTEGRATED CIRCUIT: see item 28	7-20 (8G)
1A4A10		CIRCUIT CARD ASSEMBLY: audio amplifier, combines the audio outputs of the am. detector and fm/cw/ssb detector and feeds them to the line audio level control on the rear panel and the phone level control on the front panel, .500 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into mother-board, mfr 14632, part no. 746001-2	7-2b (64)
1A4A10C1		CAPACITOR: see item 10	7-21 (8C)
1A4A10C2		CAPACITOR: see item 12	7-21 (9C)
1A4A10C3		CAPACITOR: see item 10	7-21 (8D)
1A4A10C4		CAPACITOR: same as 1A4A8C19	7-21 (7F)
1A4A10C5		Not Used	
1A4A10C6		CAPACITOR: see item 10	7-21 (8F)
1A4A10C7		CAPACITOR: same as 1A4A9C16	7-21 (10C)
1A4A10C8, 1A4A10C9		CAPACITOR: see item 10	7-21 (5G, 3G)
1A4A10C10		CAPACITOR: same as 1A4A8C19	7-21 (2G)
1A4A10C11		Not Used	
1A4A10C12, 1A4A10C13		CAPACITOR: see item 3	7-21 (4C, 6C)
1A4A10C14		CAPACITOR: see item 10	7-21 (10E)
1A4A10C15		Not Used	
1A4A10C16		Not Used	
1A4A10C17		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5000 pF, 20 pct, 500 v, mfr 91418, part no. B-GP5000PFM	7-21 (3H)
1A4A10C18		CAPACITOR, FIXED, ELECTROLYTIC: 47 μF, 10 pct, 35 v, mfr 81349, part no. CS13BF476K	7-21 (3C)
1A4A10C19		CAPACITOR: same as 1A4A10C18	7-21 (3D)
1A4A10C20		Not Used	
1A4A10C21		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 24 pF, 5 pct, 500 v, mfr 81349, part no. CM05ED240J03	7-21 (5B)
1A4A10CR1		SEMICONDUCTOR: see item 61	7-21 (7D)



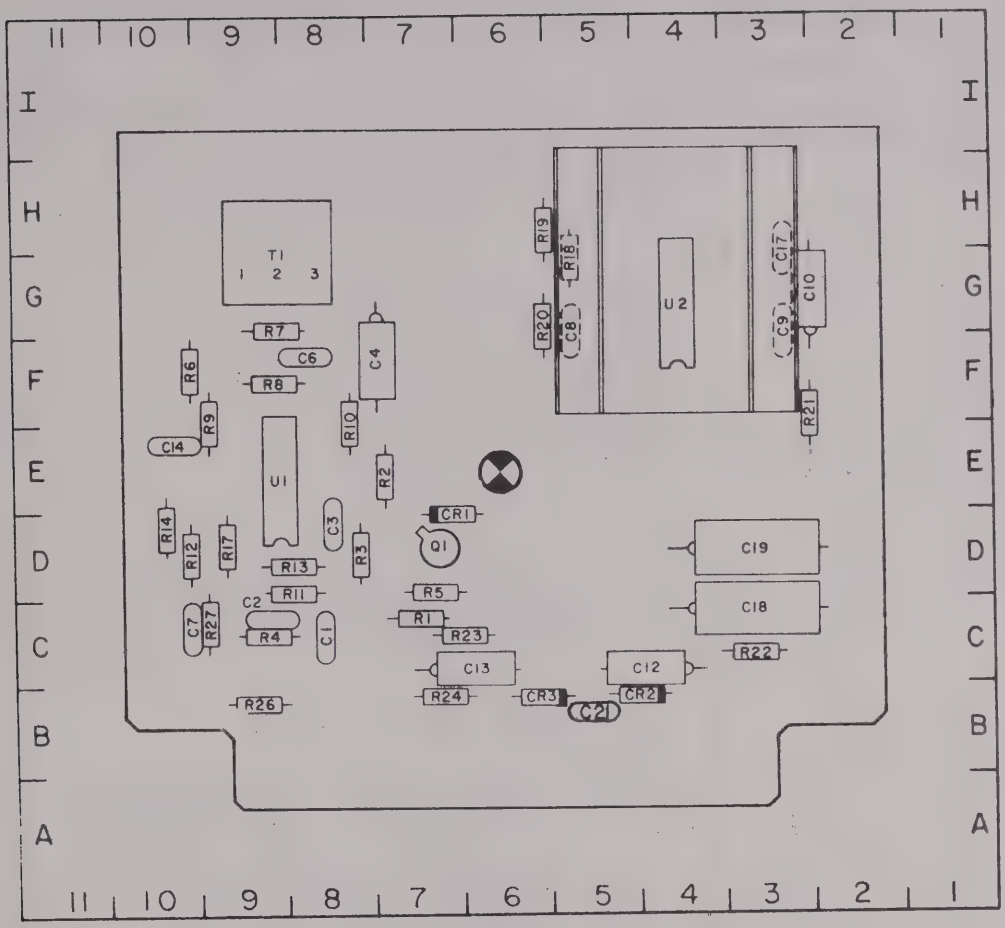
PARTS LOCATION INDEX
ASSEMBLY 1A4A9

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	4E	CR2	5H	R9	8G	R29	9E
C2	3E	L1	3G	R10	9H	R30	10D
C3	4F	L3	8H	R11	9G	R31	8F
C4	2E	MP1	UNDER Q1	R12	10G	R32	8E
C5	2F	MP2	UNDER Q2	R13	9G	R33	9D
C6	4G	MP3	UNDER Q3	R14	3C	R34	9C
C7	4G	MP4	UNDER Q4	R15	3D	R35	8C
C8	6G	MP5	6E	R16	3D	R36	4B
C9	6H	Q1	9E	R17	3D	R37	8F
C10	6F	Q2	9D	R18	2D	R38	9F
C11	7H	Q3	8E	R19	5D	R39	5F
C12	4C	Q4	8D	R20	4E	T1	5G
C13	3E	R1	4C	R21	4E	U1	3F
C14	5C	R2	3E	R22	5D	U2	4D
C15	5E	R3	4F	R23	3B	U3	8G
C16	5D	R4	3G	R24	6E		
C17	7F	R5	6G	R25	7F		
C18	5B	R6	6F	R26	8C		
C19	9F	R7	5F	R27	9C		
CR1	6G	R8	8G	R28	9F		

Figure 7-20. Fm, Cw and Ssb Detection 791599-3 (1A4A9)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A10CR2		SEMICONDUCTOR DEVICE DIODE: 80 v germanium point contact, miniature glass package, PFC 90 mA, ambient temp +90°C, .265 in. long body by .105 in. dia by .02 in. lead dia, mfr 80131, part no. 1N198A	7-21 (4B)
1A4A10CR3		SEMICONDUCTOR: same as 1A4A10CR2	7-21 (6B)
1A4A10MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A4A10, mfr 14632, part no. 746001P1	7-21 (6E)
1A4A10Q1		TRANSISTOR: switching junction fet/n-channel, T0-106 bvgss v 40, epoxy, .215 in. dia by .250 in. high, 3 lead pc mount, mfr 15818, part no. U1899E	7-21 (7D)
1A4A10R1		RESISTOR: see item 48	7-21 (7C)
1A4A10R2		RESISTOR: same as 1A4A6R6	7-21 (7E)
1A4A10R3, 1A4A10R4		RESISTOR: see item 57	7-21 (8D, 9C)
1A4A10R5		RESISTOR, FIXED, COMPOSITION: 2.2 m ohms, 5 pct, .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G225JS	7-21 (7C)
1A4A10R6		RESISTOR, FIXED, COMPOSITION: 20 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G203JS	7-21 (9F)
1A4A10R7 Thru 1A4A10R10		RESISTOR: see item 39	7-21 (8G, 9F)
1A4A10R11		RESISTOR: see item 48	7-21 (8D)
1A4A10R12		RESISTOR: see item 41	7-21 (10D)
1A4A10R13		RESISTOR, FIXED, COMPOSITION: 27 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G273JS	7-21 (9D)
1A4A10R14		RESISTOR: see item 59	7-21 (10D)
1A4A10R15		Not Used	
1A4A10R16		Not Used	
1A4A10R17		RESISTOR, FIXED, COMPOSITION: 18 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in.dia by .02 in. lead dia, mfr 81349, part no. RCR07G183JS	7-21 (9D)
1A4A10R18		RESISTOR: see item 39	7-21 (5G)



PARTS LOCATION INDEX
ASSEMBLY 1A4A10

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	8C	C17	3H	R4	9C	R18	5G
C2	9C	C18	3C	R5	7C	R19	6H
C3	8D	C19	3D	R6	9F	R20	6G
C4	7F	C21	5B	R7	8G	R21	2F
C6	8F	CR1	7D	R8	9F	R22	3C
C7	10C	CR2	4B	R9	9F	R23	7C
C8	5G	CR3	6B	R10	8F	R24	7B
C9	3G	MP1	6E	R11	8D	R27	9C
C10	2G	Q1	7D	R12	10D	RA1	UNDER U2
C12	4C	R1	7C	R13	9D	T1	9H
C13	6C	R2	7E	R14	10D	U1	8E
C14	10E	R3	8D	R17	9D	U2	4G

Figure 7-21. Audio Amplifier 746001-2 (1A4A10)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A10R19		RESISTOR, FIXED, FILM: 2.0 k ohms, 1 pct, .10 w, 200 v rated, .250 in. long body by .088 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C2001F	7-21 (6H)
1A4A10R20		RESISTOR: same as 1A4A8R56	7-21 (6G)
1A4A10R21		RESISTOR: same as 1A4A8R56	7-21 (2F)
1A4A10R22		RESISTOR: see item 36	7-21 (3C)
1A4A10R23		RESISTOR: see item 48	7-21 (7C)
1A4A10R24		RESISTOR: see item 59	7-21 (7B)
1A4A10R25		Not Used	
1A4A10R26		Not Used	
1A4A10R27		RESISTOR: see item 36	7-21 (9C)
1A4A10RA1		HEATSINK, ELECTRICAL ELECTRONIC COMPONENT: .032 brass nickel plated, 1.50 in. long by .87 in. wide w/45° top angles, mfr 14632, part no. 24566-1	7-21 (UNDER U2)
1A4A10T1		TRANSFORMER: same as 1A4A8T1	7-21 (9H)
1A4A10U1		INTEGRATED CIRCUIT: see item 28	7-21 (8E)
1A4A10U2		INTEGRATED CIRCUIT: dual 4 w stereo power amplifier, 70 dB ripple rejection, 75 dB channel separation, 3 m ohm input impedance, internal thermal protection, dual in line package 14 pin, .77 in. long by .250 in. wide by .13 in. high, mfr 27014, part no. LM378N	7-21 (4G)
1A5		CIRCUIT CARD ASSEMBLY: synthesizer motherboard, provides support and interconnections for the synthesizer section, 0.500 in. thick by 14.40 in. long by 2.20 in. wide, connects with solder terminals and plug-in connectors, mfr 14632, part no. 791570-4	7-2 Sh 2 (62)
1A5C1 Thru 1A5C58		CAPACITOR: see item 11	7-22 (9E, 8E, 7E, 6E, 5E, 4E)
1A5C59 Thru 1A5C62		CAPACITOR: see item 10	7-22 (10E, 10E, 11D, 12E)
1A5E59		TERMINAL: 5 pos, feedthru .818LGX, .025 in. sq, .50 below bd, mfr 00779, part no. PE914031-1	7-23 (3E)
1A5E60 Thru 1A5E62		TERMINAL: same as 1A5E59	7-22 (3E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5E63		TERMINAL: same as 1A5E59	7-22 (3D)
1A5J1 Thru 1A5J3		CONNECTOR: see item 21	7-22 (30D, 28C, 30E)
1A5L1 Thru 1A5L4		CHOKE: same as 1A4L1	7-22 (11D, 11E, 11E, 11C)
1A5MP1 Thru 1A5MP5		HOUSING: same as 1A4MP1	7-22 (XA1A & 3, XA2A & B, XA3)
1A5MP6		INSULATOR: thermally conductive for TO-220/TIP-32 pkg 0.687 x 0.562, mfr 18565, part no. 60-11-5791-1674	7-22 (UNDER U2)
1A5MP7		INSULATOR: same as 1A5MP6	7-22 (UNDER U2)
1A5MP8		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A5, mfr 14632, part no. 791570P1 (Attaching Hardware) G(6), F(2), C(8), A(8)	7-22 (15E)
1A5P1		CABLE: same as 1A4P1	7-22 (6I)
1A5P2		CABLE ASSEMBLY: 29 conductor, flat flex 1 plug 4.75 in. w/solder term, mfr 00779, part no. 88524-1	7-22 (6H)
1A5U1		INTEGRATED CIRCUIT: 3 terminal positive voltage regulator TO-220 pkg, 5 v, with mounting hole, mfr 07263, part no. 7805UC	7-22 (20B)
1A5U2		INTEGRATED CIRCUIT: same as 1A5U1	7-22 (29B)
1A5XA1 Thru 1A5XA3		CONTACT STRIP: same as 1A4XA1	7-22 (25E, 25C, 7D)
1A5A1		CIRCUIT CARD ASSEMBLY: 1st and 3rd lo synthesizer/time base, aluminum alloy plate with pc board, and brass chassis. Connects the 1st and 3rd lo/time base circuit board to the 1st lo vco circuit, 16.36 in. long by 3.92 in. wide by .75 in. thk, connected by plugging in and cable connectors, mfr 14632, part no. 791630-4	7-2b (63)
1A5A1C1		CAPACITOR: same as 1A4A2C11	7-23 (3)

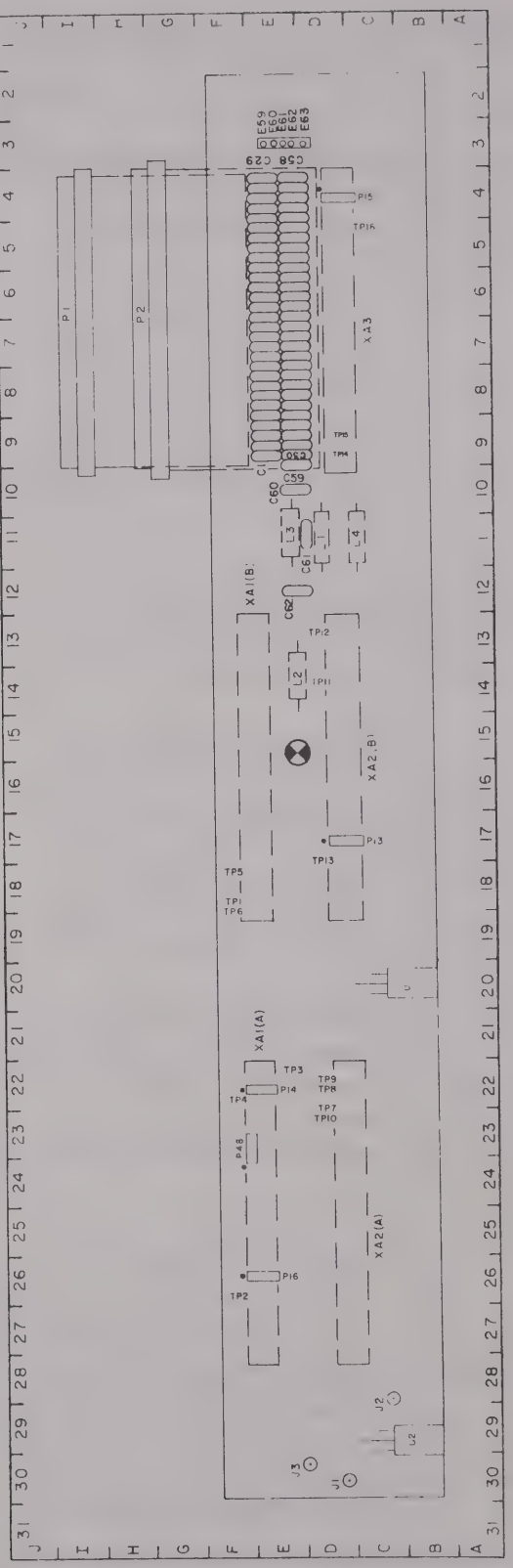


Figure 7-22. Synthesizer Motherboard 791570-4 (1A5)

PARTS LOCATION INDEX
ASSEMBLY 1A5

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	9E	C31	9E	C61	11D
C2	9E	C32	9E	C62	12E
C3	9E	C33	9E	E59	3E
C4	9E	C34	9E	E60	3E
C5	9E	C35	8E	E61	3E
C6	8E	C36	8E	E62	3E
C7	8E	C37	8E	E63	3D
C8	8E	C38	8E	J1	30D
C9	8E	C39	8E	J2	28C
C10	8E	C40	7E	J3	30E
C11	7E	C41	7E	L1	11D
C12	7E	C42	7E	L2	14E
C13	7E	C43	7E	L3	11E
C14	7E	C44	7E	L4	11C
C15	7E	C45	6E	MP1	XA1(A)
C16	6E	C46	6E	MP2	XA1(B)
C17	6E	C47	6E	MP3	XA2(A)
C18	6E	C48	6E	MP4	XA2(B)
C19	6E	C49	6E	MP5	XA3
C20	6E	C50	5E	MP6	UNDER U1
C21	5E	C51	5E	MP7	UNDER U2
C22	5E	C52	5E	MP8	15E
C23	5E	C53	5E	P1	6I
C24	5E	C54	4E	P2	6H
C25	5E	C55	4E	U1	20B
C26	4E	C56	4E	U2	29B
C27	4E	C57	4E	XA1	25E
C28	4E	C58	4E	XA2	25C
C29	4E	C59	10E	XA3	7D
C30	9E	C60	10E		

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1C2		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.47 µF, 20 pct, 100 v, mfr 72982, part no. 8131M100-651-474M	7-23 (6)
1A5A1C3		CAPACITOR: same as 1A4A2C11	7-23 (4)
1A5A1C4		CAPACITOR, FIXED, CERAMIC DIELECTRIC: .05 µF, 20 pct, 100 v, mfr 56289, part no. C023B101R503M	7-23 (8)
1A5A1C5		CAPACITOR: see item 7	7-23 (34)
1A5A1C6		CAPACITOR: same as 1A5A1C2	7-23 (30)
1A5A1C7		CAPACITOR: see item 7	7-23 (38)
1A5A1C8		CAPACITOR: same as 1A5A1C4	7-23 (39)
1A5A1CR1 Thru 1A5A1CR3		SEMICONDUCTOR: see item 61	7-23 (31, 32, 33)
1A5A1FB1 Thru 1A5A1FB17		FERRITE BEAD: see item 23	7-23 (11-27)
1A5A1L1		COIL, RADIO FREQUENCY: 10 mH, 10 pct, pc mount, .375 in. dia by .375 in. wide, .025 in. dia tinned leads, mfr 71279, part no. 553-3635-49	7-23 (28)
1A5A1L2		COIL, RADIO FREQUENCY: 0.82 µH, 10 pct min Q50, resonant freq 220 MHz, current rating 1020 mA, phenolic, .375 in. long by .156 in. dia, .025 dia leads, mfr 99800, part no. 1537-10	7-23 (5)
1A5A1L3		COIL: same as 1A5A1L1	7-23 (9)
1A5A1L4		COIL, RADIO FREQUENCY: 4.7 mH, 10 pct, pc mount, .375 in. dia by .375 in. wide, .025 in. dia tinned leads, mfr 71279, part no. 553-3635-45	7-23 (10)
1A5A1MP1 Thru 1A5A1MP20		TERMINAL: subminiature standoff, Teflon bushing, silver plated terminal, .350 in. long by .148 in. mounting dia, mfr 04013, part no. S0S1.	7-23 (2)
1A5A1MP21		INSULATOR: same as 1A5MP2	7-23 (40)
1A5A1MP22		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A5A1, mfr. 14632, part no. 791630P1	7-23 (1)
1A5A1R1		RESISTOR: see item 36	7-23 (29)
1A5A1R2		RESISTOR: same as 1A4A1R53	7-23 (7)

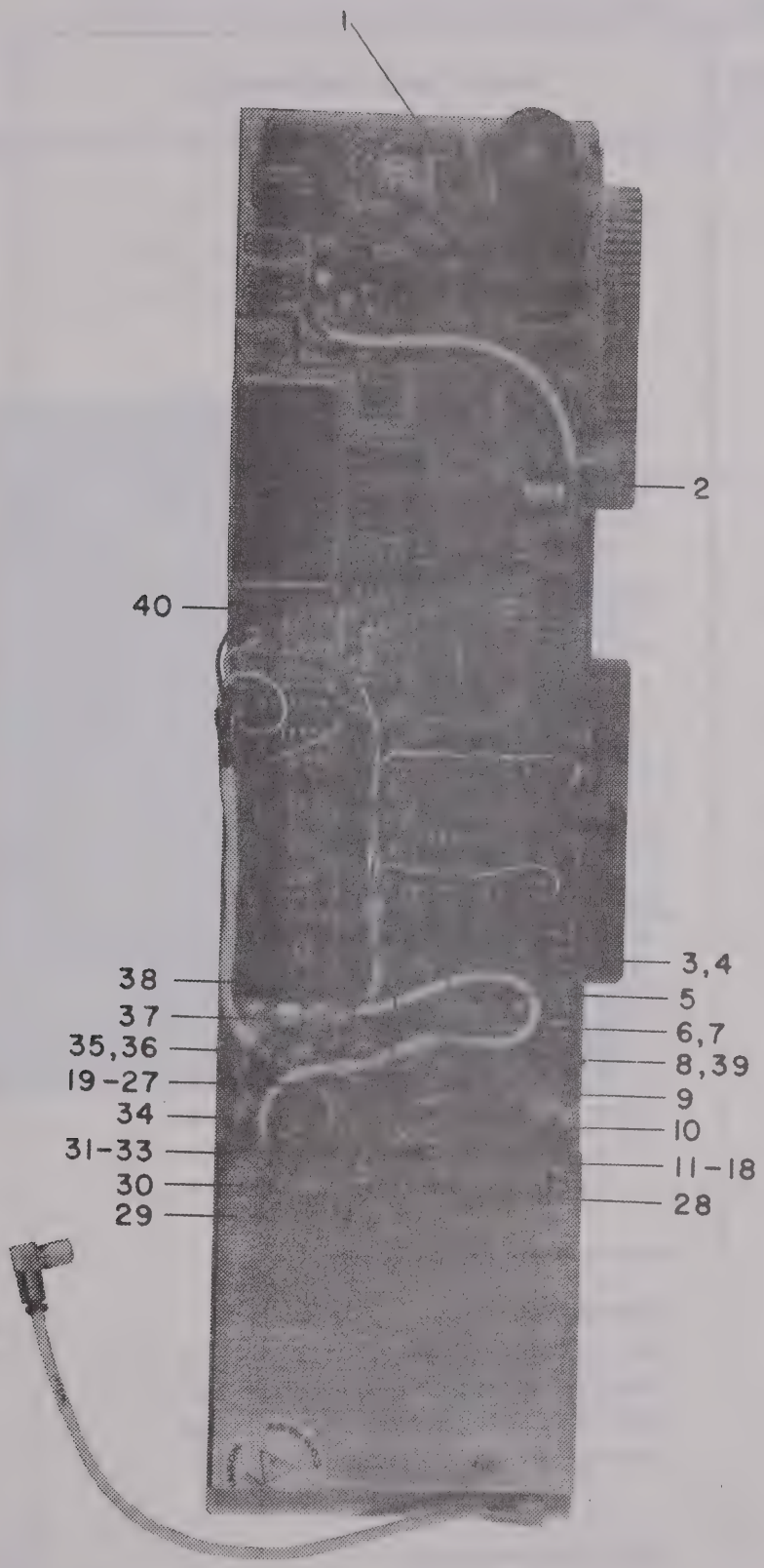


Figure 7-23. 1st and 3rd Lo Synthesizer 791630-4 (1A5A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1R3, 1A5A1R4		RESISTOR: see item 37	7-23 (35, 36)
1A5A1VR1		VOLTAGE REGULATOR: 3 terminal neg voltage, heat sink mounting surface plastic package, output voltage, -11.5 min -12.5 max, mfr 04713, part no. MC7912CP	7-23 (37)
1A5A1A1		1st LO, VCO ASSEMBLY: copper flashed nickel plated brass chassis with rfi lined cover, 3.38 in. long by 3.12 in. wide by .63 in. high, connected by 2 cables, mfr 14632, part no. 791629	7-24
1A5A1A1C1 Thru 1A5A1A1C4		CAPACITOR: see item 13	7-24 (5, 6, 8, 10)
1A5A1A1C5		CAPACITOR, FIXED, ELECTROLYTIC: 68 µF, 20 pct, 15 v, ultra-miniature solid tantalex .475 in. high by .375 in. wide by .15 in. thick, mfr 56289, part no. 183DR686X0015F	7-24 (4)
1A5A1A1C6		CAPACITOR: see item 13	7-24 (12)
1A5A1A1C7		CAPACITOR: see item 10	7-24 (3)
1A5A1A1E1		CONNECTOR/TERMINATION: right angle 1/4 sq chassis mount, used with RG-188, mfr 19505, part no. 144/188	7-24 (14)
1A5A1A1P1		CONNECTOR: see item 16	7-24 (2)
1A5A1A1P2		CONNECTOR: see item 17	7-24 (1)
1A5A1A1R1		RESISTOR, FIXED, COMPOSITION: 1.2 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G122JS	7-24 (9)
1A5A1A1R2, 1A5A1A1R3		RESISTOR: same as 1A5A1A1R1	7-24 (11, 13)
1A5A1A1R4		RESISTOR: see item 34	7-24 (9)
1A5A1A1A1		CIRCUIT CARD ASSEMBLY: 1st lo/vco etched circuit board, part of the 1st lo synthesizer loop, 0.500 in. thick by 3.2 in. long by 2.65 in. wide connected by solder terminals mfr 14632, part no. 34750	7-25
1A5A1A1A1C1 Thru 1A5A1A1A1C4		CAPACITOR: see item 9	7-25 (7B, 6B, 5B)

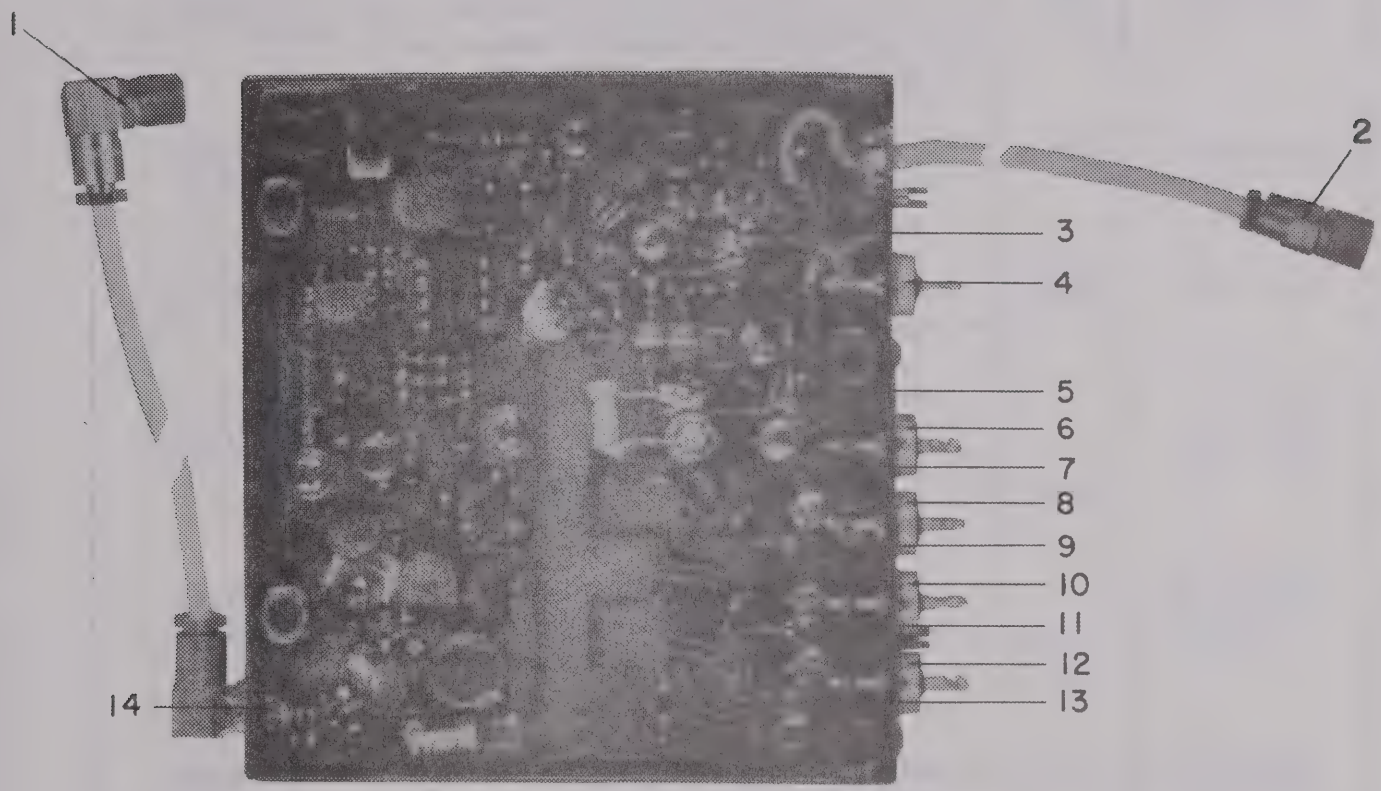


Figure 7-24. 1st Lo/Vco Assembly 791629 (1A5A1A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1C5		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 pF 0.25 pF tol, 500 v, solder in disc .025 in. dia, .06 in. thick with tinned electrodes, mfr 91984, part no. 603C0G3R0C	7-25 (5C)
1A5A1A1A1C6	Note 1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5.0 pF 0.5 pF tol, 500 v npo tubular, mfr 72982, part no. 301-000P2H0-509D	7-25 (5C)
1A5A1A1A1C6	Note 1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5.1 pF .05 pF tol, 500 v npo, tubular, mfr 72982, part no. 301-000C0H0-519D	7-25 (5C)
1A5A1A1A1C6	Note 1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5.6 pF 0.5 pF tol, 500 v npo tubular, mfr 72982, part no. 301-000U2J0-569D	7-25 (5C)
1A5A1A1A1C7		CAPACITOR, FIXED, COMPOSITION: 2.7 pF, 10 pct, 500 v, axial leads, .156 in. dia body, mfr 95121, part no. QC2.7PFK	7-25 (4C)
1A5A1A1A1C8		CAPACITOR: same as 1A5A1A1A1C1	7-25 (5B)
1A5A1A1A1C9		CAPACITOR, FIXED, COMPOSITION: 1.0 pF, 10 pct, 500 v, axial leads, .156 in. dia body, mfr 95121, part no. QC1.0PFK	7-25 (4C)
1A5A1A1A1C10		CAPACITOR: see item 9	7-25 (4B)
1A5A1A1A1C11		CAPACITOR: see item 12	7-25 (3B)
1A5A1A1A1C12, 1A5A1A1A1C13		CAPACITOR: see item 9	7-25 (3C, 3B)
1A5A1A1A1C14		CAPACITOR: see item 2	7-25 (2C)
1A5A1A1A1C15		CAPACITOR, FIXED, MICA DIELECTRIC: 100 pF, 2 pct, 500 v, mfr 81349, part no. CM04FD101G03	7-25 (3D)
1A5A1A1A1C16, 1A5A1A1A1C17		CAPACITOR: see item 9	7-25 (3C, 3D)
1A5A1A1A1C18		CAPACITOR, FIXED, ELECTROLYTIC: 2.2 µF, 10 pct, 20 v, mfr 81349, part no. CS13BE225K	7-25 (5F)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1C19 Thru 1A5A1A1A1C21		CAPACITOR: see item 2	7-25 (3E, 6F)
1A5A1A1A1C22		Not Used	
1A5A1A1A1C23		CAPACITOR: see item 2	7-25 (7F)
1A5A1A1A1C24		Not Used	
1A5A1A1A1C25		CAPACITOR: see item 2	7-25 (7E)
1A5A1A1A1C26		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5000 pF, 20 pct, 100 v, .300 in. dia x .156 in. thk, mfr 56289, part no. C023B101E502M	7-25 (7E)
1A5A1A1A1C27, 1A5A1A1A1C28		CAPACITOR: same as 1A5A1A1A1C26	7-25 (6E, 8E)
1A5A1A1A1C29		CAPACITOR: see item 2	7-25 (4F)
1A5A1A1A1CR1		SEMICONDUCTOR DEVICE, DIODE: pin, switching, silicon, V_R 35 v, .152 in. x .115 in. by .07 in. thk, .03 in. flat leads, mfr 04713, part no. MPN3401	7-25 (7B)
1A5A1A1A1CR2, 1A5A1A1A1CR3		SEMICONDUCTOR: same as 1A5A1A1A1CR1	7-25 (7B, 6B)
1A5A1A1A1CR4		SEMICONDUCTOR DEVICE, DIODE: vhf and uhf tuning, SOD-23 package, 1.62 in. x .098 in. with flat leads .035 in., mfr 52673, part no. U11-3102	7-25 (5B)
1A5A1A1A1FB1		FERRITE BEAD: see item 23	7-25 (4B)
1A5A1A1A1L1		COIL, RADIO FREQUENCY: .125 in. dia, 3 turns no. 22 sns wire counter clockwise close-wound, mfr 14632, part no. 24592-1	7-25 (8C)
1A5A1A1A1L2		COIL, RADIO FREQUENCY: .125 in. dia, 7 turns no. 22 sns wire counter clockwise close-wound, mfr 14632, part no. 24593-1	7-25 (7C)
1A5A1A1A1L3		COIL: same as 1A5A1A1A1L2	7-25 (7C)
1A5A1A1A1L4		COIL, RADIO FREQUENCY: .125 in. dia, 6 turns no. 22 sns wire counter clockwise close-wound, mfr 14632, part no. 24593-2	7-25 (6C)
1A5A1A1A1L5		COIL: same as 1A3A2L4	7-25 (4B)
1A5A1A1A1MP1 Thru 1A5A1A1A1MP4		INSULATOR: see item 25	7-25 (UNDER Q1-Q3, Q5)
1A5A1A1A1MP5		INSULATOR: same as 1A3A2MP2	7-25 (UNDER Q7)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

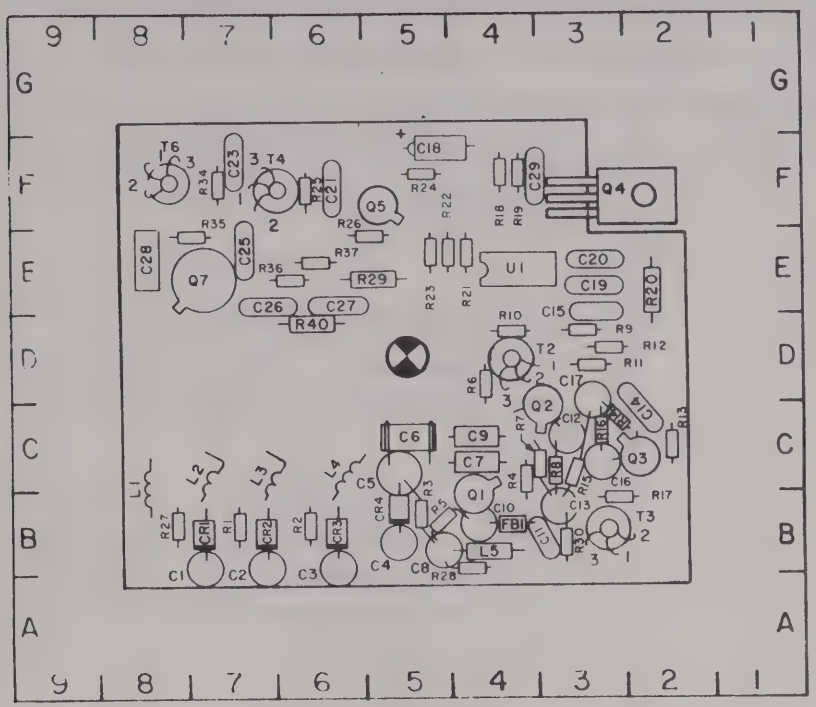
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1MP6		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A5A1A1A1, mfr 14632, part no. 34750P1 (Attaching Hardware) D (6), C (6), A (6) SCREW, MACHINE: pan head 4-40 x 5/16 black nylon, mfr 96906, part no. MS18212-14 black (1)	7-25 (4D)
1A5A1A1A1Q1		TRANSISTOR: N-channel silicon junction fet, TO-52, 3 lead, gate source voltage -25 v gate current 20 mA, mfr 17856, part no. U310	7-25 (4B)
1A5A1A1A1Q2, 1A5A1A1A1Q3		TRANSISTOR: see item 64	7-25 (3C, 2C)
1A5A1A1A1Q4		TRANSISTOR: if. med power amplifier plastic pnp silicon case 77-03, mfr 80131, part no. 2N4918	7-25 (2F)
1A5A1A1A1Q5		TRANSISTOR: low-power saturated-switching, pnp silicon, TO-18, mfr 80131, part no. 2N3251	7-25 (5F)
1A5A1A1A1Q6		Not Used	
1A5A1A1A1Q7		TRANSISTOR: same as 1A3A2Q3	7-25 (7E)
1A5A1A1A1R1		RESISTOR, FIXED, COMPOSITION: 33 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G333JS	7-25 (7B)
1A5A1A1A1R2		RESISTOR, FIXED, COMPOSITION: 12 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G123JS	7-25 (6B)
1A5A1A1A1R3		RESISTOR, FIXED, COMPOSITION: 22 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G223JS	7-25 (5B)
1A5A1A1A1R4		RESISTOR, FIXED, COMPOSITION: 470 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G471JS	7-25 (4C)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1R5		RESISTOR, FIXED, COMPOSITION: 100 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 14632, part no. RCR05G104JS	7-25 (5B)
1A5A1A1A1R6		RESISTOR, FIXED, COMPOSITION: 8.2 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G822JS	7-25 (4D)
1A5A1A1A1R7		RESISTOR, FIXED, COMPOSITION: 5.6 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G562JS	7-25 (3C)
1A5A1A1A1R8		RESISTOR, FIXED, COMPOSITION: 300 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G301JS	7-25 (3C)
1A5A1A1A1R9		RESISTOR, FIXED, COMPOSITION: 220 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G221JS	7-25 (3D)
1A5A1A1A1R10		RESISTOR, FIXED, COMPOSITION: 68 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G680JS	7-25 (4D)
1A5A1A1A1R11		RESISTOR, FIXED, COMPOSITION: 180 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G181JS	7-25 (3D)
1A5A1A1A1R12		RESISTOR: same as 1A5A1A1A1R10	7-25 (3D)
1A5A1A1A1R13		RESISTOR: same as 1A5A1A1A1R6	7-25 (2C)
1A5A1A1A1R14		RESISTOR: same as 1A5A1A1A1R7	7-25 (3C)
1A5A1A1A1R15		RESISTOR: see item 34	7-25 (3C)
1A5A1A1A1R16		RESISTOR: same as 1A5A1A1A1R8	7-25 (3C)
1A5A1A1A1R17		RESISTOR: same as 1A3A1R4	7-25 (3B)
1A5A1A1A1R18		RESISTOR: see item 33	7-25 (4F)
1A5A1A1A1R19		RESISTOR, FIXED, COMPOSITION: 390 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G391JS	7-25 (4F)
1A5A1A1A1R20		RESISTOR: see item 35	7-25 (2E)
1A5A1A1A1R21, 1A5A1A1A1R22		RESISTOR: see item 34	7-25 (4E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1R23		RESISTOR, FIXED, COMPOSITION: 10 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G100JS	7-25 (5E)
1A5A1A1A1R24		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G330JS	7-25 (5F)
1A5A1A1A1R25		RESISTOR, FIXED, COMPOSITION: 270 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G271JS	7-25 (6F)
1A5A1A1A1R26		RESISTOR: same as 1A5A1A1A1R15	7-25 (5E)
1A5A1A1A1R27		RESISTOR: same as 1A5A1A1A1R1	7-25 (8B)
1A5A1A1A1R28		RESISTOR: same as 1A5A1A1A1R15	7-25 (4B)
1A5A1A1A1R29		RESISTOR: see item 45	7-25 (5E)
1A5A1A1A1R30		RESISTOR: same as 1A5A1A1A1R15	7-25 (3B)
1A5A1A1A1R31 Thru 1A5A1A1A1R33		Not Used	
1A5A1A1A1R34		RESISTOR, FIXED, COMPOSITION: 15 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G150JS	7-25 (7F)
1A5A1A1A1R35		RESISTOR, FIXED, COMPOSITION: 560 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G561JS	7-25 (7E)
1A5A1A1A1R36		RESISTOR: see item 33	7-25 (6E)
1A5A1A1A1R37		RESISTOR: see item 34	7-25 (6E)
1A5A1A1A1R38, 1A5A1A1A1R39		Not Used	
1A5A1A1A1R40		RESISTOR, FIXED, COMPOSITION: 51 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G510JS	7-25 (6D)
1A5A1A1A1T1		part of 1A5A1A1A1 board	7-25 (5D)
1A5A1A1A1T2		TRANSFORMER, RADIO FREQUENCY: toroidal, twisted bifilar on doughnut core, .45 μH, mfr 14632, part no. 21278-23	7-25 (4D)
1A5A1A1A1T3		TRANSFORMER: same as 1A5A1A1A1T2	7-25 (3B)



PARTS LOCATION INDEX
ASSEMBLY 1A5A1A1A1

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	7B	C26	7E	Q4	2F	R21	4E
C2	7B	C27	6E	Q5	5F	R22	4E
C3	6B	C28	8E	Q7	7E	R23	5E
C4	5B	C29	4F	R1	7B	R24	5F
C5	5C	CR1	7B	R2	6B	R25	6F
C6	5C	CR2	7B	R3	5B	R26	5E
C7	4C	CR3	6B	R4	4C	R27	8B
C8	5B	CR4	5B	R5	5B	R28	4B
C9	4C	FB1	4B	R6	4D	R29	5E
C10	4B	L1	8C	R7	3C	R30	3B
C11	3B	L2	7C	R8	3C	R34	7F
C12	3C	L3	7C	R9	3D	R35	7E
C13	3B	L4	6C	R10	4D	R36	6E
C14	2C	L5	4B	R11	3D	R37	6E
C15	3D	MP1	UNDER Q1	R12	3D	R40	6D
C16	3C	MP2	UNDER Q2	R13	2C	T1	5D
C17	3D	MP3	UNDER Q3	R14	3C	T2	4D
C18	5F	MP4	UNDER Q5	R15	3C	T3	3B
C19	3E	MP5	UNDER Q7	R16	3C	T4	6F
C20	3E	MP6	5D	R17	3B	T6	8F
C21	6F	Q1	4B	R18	4F	U1	4E
C23	7F	Q2	3C	R19	4F		
C25	7E	Q3	2C	R20	2E		

Figure 7-25. 1st Lo/Vco 34750 (1A5A1A1A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1T4		TRANSFORMER, RADIO FREQUENCY: toroidal, twisted bifilar on doughnut core, 1.1 µH, mfr 14632, part no. 21278-27	7-25 (6F)
1A5A1A1A1T5		Not Used	
1A5A1A1A1T6		TRANSFORMER: same as 1A5A1A1A1T4	7-25 (8F)
1A5A1A1A1U1		INTEGRATED CIRCUIT: 1 GHz divide by 4 prescaler, plastic package 8 pin dual in line, mfr 04713, part no. MC1697P	7-25 (4E)
1A5A1A2		CIRCUIT CARD ASSEMBLY: first and third lo synthesizer time base, etched circuit board 3rd lo has an input of two reference frequencies from the time base and a fixed output frequency of 11.155 MHz, 0.50 in. thk by 8.80 in. long by 3.85 in. wide, mfr 14632, part no. 791600-4	7-26
1A5A1A2C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 47 pF, 2 pct, 500 v, mfr 81349, part no. CM04ED470G03	7-26 (18H)
1A5A1A2C2		CAPACITOR: same as 1A5A1A2C1	7-26 (18G)
1A5A1A2C3		CAPACITOR: see item 2	7-26 (18G)
1A5A1A2C4 Thru 1A5A1A2C6		Not Used	
1A5A1A2C7 Thru 1A5A1A2C15		CAPACITOR: see item 11	7-26 (17I, 17H, 15F, 10F, 18G, 13E, 15E, 14E, 16E)
1A5A1A2C16		CAPACITOR: see item 6	7-26 (19B)
1A5A1A2C17		CAPACITOR: see item 2	7-26 (12H)
1A5A1A2C18		CAPACITOR, FIXED, PLASTIC DIELECTRIC: 4700 pF, 10 pct, 100 v, film wrap, epoxy end fill, .156 in. dia by .500 in. long, mfr 14655, part no. WMF1D47	7-26 (12F)
1A5A1A2C19		Not Used	
1A5A1A2C20		CAPACITOR, FIXED, CERAMIC DIELECTRIC: .1 µF, 20 pct, 100 v, mono bloc .300 in. x .300 in. sq, mfr 72982, part no. 8131M100-651-104M	7-26 (13H)
1A5A1A2C21		CAPACITOR: see item 11	7-26 (4D)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2C22		CAPACITOR: see item 1	7-26 (4D)
1A5A1A2C23		CAPACITOR, FIXED, MICA DIELECTRIC: 820 pF, 5 pct, 300 v, mfr 72136, part no. DM15-821J	7-26 (7D)
1A5A1A2C24		Not Used	
1A5A1A2C25, 1A5A1A2C26		CAPACITOR: see item 6	7-26 (10C, 19D)
1A5A1A2C27		Not Used	
1A5A1A2C28		CAPACITOR: see item 8	7-26 (9C)
1A5A1A2C29		CAPACITOR, FIXED, ELECTROLYTIC: 100 µF, 20 pct, 10 v, solid tantalum, mfr 56289, part no. D107X0010PE4	7-26 (4E)
1A5A1A2C30		CAPACITOR, FIXED, ELECTROLYTIC: 2.2 µF, 20 pct, 35 v, solid tantalum, mfr 56289, part no. 196D225X0035JE3	7-26 (3E)
1A5A1A2C31		CAPACITOR: see item 6	7-26 (5F)
1A5A1A2C32		CAPACITOR: same as 1A5A1A2C20	7-26 (5F)
1A5A1A2C33		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 2-8 pF, 350 v, .375 in. dia, 2 leads, top adjust, mfr 72982, part no. 538-006A2-8	7-26 (3F)
1A5A1A2C34		CAPACITOR, FIXED, MICA DIELECTRIC: 220 pF, 2 pct, pct, 500 v, mfr 81349, part no. CM05FD221G03	7-26 (6E)
1A5A1A2C35		CAPACITOR: same as 1A5A1A2C34	7-26 (6E)
1A5A1A2C36, 1A5A1A2C37		CAPACITOR: see item 11	7-26 (5H, 5G)
1A5A1A2C38, 1A5A1A2C39		CAPACITOR: see item 6	7-26 (2D, 3B)
1A5A1A2C40		Not Used	
1A5A1A2C41		CAPACITOR: see item 11	7-26 (8E)
1A5A1A2C42		CAPACITOR: see item 6	7-26 (4F)
1A5A1A2C43	Note 1	CAPACITOR, FIXED, MICA DIELECTRIC: 12 pF, 5 pct, 500 v, mfr 81349, part no. CM04CD120J03	7-26 (4E)
1A5A1A2C43	Note 1	CAPACITOR, FIXED, MICA DIELECTRIC: 15 pF, 5 pct, 500 v, mfr 81349, part no. CM04CD150J03	7-26 (4E)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2C43	Note 1	CAPACITOR, FIXED, MICA DIELECTRIC: 18 pF, 5 pct, 500 v, mfr 81349, part no. CM04CD180J03	7-26 (4E)
1A5A1A2C44		CAPACITOR: same as 1A4A9C7	7-26 (14H)
1A5A1A2C45		CAPACITOR: see item 5	7-26 (6F)
1A5A1A2CR1		SEMICONDUCTOR DEVICE, DIODE: schottky barrier, .34 v at 1 mA, pico-second switching speed, high breakdown voltage, up to 70 v, .076 in. dia x .170 in. long, mfr 28480, part no. 5082-2800	7-26 (12H)
1A5A1A2CR2, 1A5A1A2CR3		SEMICONDUCTOR: same as 1A5A1A2CR1	7-26 (12G, 12C)
1A5A1A2CR4		SEMICONDUCTOR DEVICE, DIODE: LED, red high efficiency T1 dia, 2.0 mcd at 10 mA, mfr 28480, part no. 5082-4684	7-26 (12F)
1A5A1A2CR5, 1A5A1A2CR6		Not Used	
1A5A1A2CR7		SEMICONDUCTOR: same as 1A5A1A1A1CR4	7-26 (3E)
1A5A1A2CR8		SEMICONDUCTOR DEVICE, DIODE: zener 15 v silicon, 400 mW, DO-35, glass, mfr 80131, part no. 1N965B	7-26 (17E)
1A5A1A2CR9, 1A5A1A2CR10		SEMICONDUCTOR: same as 1A5A1A2CR8	7-26 (17D)
1A5A1A2CR11		SEMICONDUCTOR: same as 1A5A1A2CR1	7-26 (14H)
1A5A1A2E1		TERMINAL: forked, silver, for .062 bd, .094 in. wire area, .094 in. dia x .156 in. off bd, mfr 71279, part no. 140-1941-02-01	7-26 (19E)
1A5A1A2J1		CONNECTOR, RECEPTACLE, ELECTRICAL: right angle pc jack receptacle, 17/32 x 19/32, 10-32 threads, 50-ohm, mfr 98291, part no. 50-053-0000	7-26 (19H)
1A5A1A2L1		COIL, RADIO FREQUENCY: 0.24 μH, 15 pct, .125 in. dia x .25 in. long, mfr 99848, part no. 200-11	7-26 (18I)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2L2		COIL, RADIO FREQUENCY: 8.2 µH, 10 pct, iron core, .375 in. long x .156 in. dia, mfr 99800, part no. 1537-34	7-26 (4D)
1A5A1A2L3		COIL, RADIO FREQUENCY: 100 µH, 10 pct, min Q80, .375 in. long by .375 in. dia, mfr 71279, part no. 553-3635-25	7-26 (3D)
1A5A1A2MP1 Thru 1A5A1A2MP5		INSULATOR: see item 26	7-26 (UNDER Q6-Q10)
1A5A1A2MP7		INSULATOR: converter insulator for 8 lead micrologic networks, converts leads to dip lead breakout, .140 in. high, mfr 19080, part no. RCT05145-8	7-26 (UNDER Q7)
1A5A1A2MP7		INSULATOR: see item 24	7-26 (UNDER) VR1)
1A5A1A2MP8		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A5A1A2, mfr 14632, part no. 791600P1 (Attaching Hardware) G(6), C(6), A(6)	7-26 (10E)
1A5A1A2Q1		Not Used	
1A5A1A2Q2		TRANSISTOR: high speed switch and amplifier, npn silicon, T0-92, mfr 80131, part no. 2N4401	7-26 (18E)
1A5A1A2Q3		TRANSISTOR: same as 1A5A1A2Q2	7-26 (18E)
1A5A1A2Q4		TRANSISTOR: same as 1A5A1A2Q2	7-26 (18D)
1A5A1A2Q5		Not Used	
1A5A1A2Q6		TRANSISTOR: high speed switch saturated, npn silicon, TO-18, mfr 80131, part no. 2N706	7-26 (9D)
1A5A1A2Q7		TRANSISTOR: same as 1A5A1A2Q6	7-26 (8C)
1A5A1A2Q8, 1A5A1A2Q9		TRANSISTOR: see item 63	7-26 (6G, 5G)
1A5A1A2Q10		TRANSISTOR: same as 1A5A1A2Q6	7-26 (4G)
1A5A1A2R1		RESISTOR: see item 36	7-26 (18H)
1A5A1A2R2, 1A5A1A2R3		RESISTOR: see item 55	7-26 (17G)
1A5A1A2R4		RESISTOR, FIXED, COMPOSITION: 82 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia, mfr 81349, part no. RCR05G823JS	7-26 (13C)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R5		RESISTOR: same as 1A5A1A2R4	7-26 (12C)
1A5A1A2R6	Note 1	RESISTOR, FIXED, COMPOSITION: 6.2 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G622JS	7-26 (13G)
1A5A1A2R6	Note 1	RESISTOR: see item 59	7-26 (13G)
1A5A1A2R6	Note 1	RESISTOR, FIXED, COMPOSITION: 7.5 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G752JS	7-26 (13G)
1A5A1A2R7	Note 1	RESISTOR, FIXED, COMPOSITION: 5.1 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G512JS	7-26 (12H)
1A5A1A2R7	Note 1	RESISTOR: same as 1A4A7R35	7-26 (12H)
1A5A1A2R7	Note 1	RESISTOR, FIXED, COMPOSITION: 6.2 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G622JS	7-26 (12H)
1A5A1A2R8	Note 1	RESISTOR, FIXED, COMPOSITION: 91 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G913JS	7-26 (12F)
1A5A1A2R8	Note 1	RESISTOR: see item 39	7-26 (12F)
1A5A1A2R8	Note 1	RESISTOR, FIXED, COMPOSITION: 110 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G114JS	7-26 (12F)
1A5A1A2R9 Thru 1A5A1A2R12		RESISTOR: see item 36	7-26 (18C, 17C)
1A5A1A2R13 Thru 1A5A1A2R22		RESISTOR: see item 32	7-26 (12C, 13C, 14C, 16C, 15C)
1A5A1A2R23		RESISTOR: see item 47	7-26 (17E)
1A5A1A2R24		RESISTOR: see item 38	7-26 (17E)
1A5A1A2R25		RESISTOR: same as 1A5A1A2R4	7-26 (13C)
1A5A1A2R26		RESISTOR: same as 1A4A10R6	7-26 (18F)
1A5A1A2R27		RESISTOR: see item 47	7-26 (17E)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R28		RESISTOR: see item 38	7-26 (17D)
1A5A1A2R29		RESISTOR: same as 1A4A10R6	7-26 (18E)
1A5A1A2R30		RESISTOR: see item 47	7-26 (17D)
1A5A1A2R31		RESISTOR: see item 38	7-26 (17C)
1A5A1A2R32		RESISTOR: same as 1A4A10R6	7-26 (18D)
1A5A1A2R33		RESISTOR: same as 1A5A1A2R4	7-26 (14C)
1A5A1A2R34		RESISTOR: see item 59	7-26 (7F)
1A5A1A2R35		RESISTOR: same as 1A4A7R35	7-26 (8D)
1A5A1A2R36		RESISTOR, FIXED, COMPOSITION: 27 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G273JS	7-26 (15C)
1A5A1A2R37		RESISTOR: same as 1A5A1A2R36	7-26 (15C)
1A5A1A2R38		RESISTOR: see item 50	7-26 (8D)
1A5A1A2R39		RESISTOR: see item 47	7-26 (8D)
1A5A1A2R40		RESISTOR: see item 49	7-26 (9D)
1A5A1A2R41		RESISTOR, FIXED, COMPOSITION: 4.3 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G432JS	7-26 (8C)
1A5A1A2R42		RESISTOR: see item 47	7-26 (8C)
1A5A1A2R43		RESISTOR: see item 37	7-26 (7C)
1A5A1A2R44		RESISTOR: see item 55	7-26 (7C)
1A5A1A2R45		RESISTOR: same as 1A5A1A2R36	7-26 (16C)
1A5A1A2R46, 1A5A1A2R47		RESISTOR: see item 49	7-26 (7C)
1A5A1A2R48		RESISTOR: see item 37	7-26 (3E)
1A5A1A2R49		RESISTOR: same as 1A3A2R26	7-26 (4F)
1A5A1A2R50		RESISTOR: see item 38	7-26 (4F)
1A5A1A2R51, 1A5A1A2R52		RESISTOR: see item 37	7-26 (4F, 6F)
1A5A1A2R53		RESISTOR: see item 38	7-26 (6F)
1A5A1A2R54		RESISTOR: see item 45	7-26 (6F)
1A5A1A2R55		RESISTOR, FIXED, COMPOSITION: 27 ohms, 5 pct, .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G270JS	7-26 (5E)
1A5A1A2R56		RESISTOR: see item 49	7-26 (6F)
1A5A1A2R57		RESISTOR: see item 45	7-26 (5H)
1A5A1A2R58, 1A5A1A2R59		RESISTOR: see item 42	7-26 (5H)
1A5A1A2R60		Not Used	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R61		RESISTOR: see item 38	7-26 (4H)
1A5A1A2R62		Not Used	
1A5A1A2R63		RESISTOR: see item 46	7-26 (4H)
1A5A1A2R64		RESISTOR, FIXED, COMPOSITION: 3.3 ohms, 5 pct, .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G3R3JS	7-26 (4H)
1A5A1A2R65 Thru 1A5A1A2R68		RESISTOR: see item 37	7-26 (16H, 16I, 14G)
1A5A1A2R69 Thru 1A5A1A2R72		RESISTOR: see item 33	7-26 (11C)
1A5A1A2R73		RESISTOR: see item 38	7-26 (11D)
1A5A1A2R74		RESISTOR: see item 55	7-26 (12F)
1A5A1A2R75, 1A5A1A2R76		RESISTOR: see item 37	7-26 (3F, 3G)
1A5A1A2R77		RESISTOR: see item 45	7-26 (6F)
1A5A1A2R78		RESISTOR, FIXED, COMPOSITION: 47 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G473JS	7-26 (14C)
1A5A1A2R79		RESISTOR: same as 1A5A1A2R78	7-26 (12C)
1A5A1A2R80, 1A5A1A2R81		RESISTOR: see item 37	7-26 (3G, 3F)
1A5A1A2R82		RESISTOR: see item 54	7-26 (4D)
1A5A1A2R83		RESISTOR: see item 36	7-26 (4E)
1A5A1A2R84, 1A5A1A2R85		RESISTOR: see item 37	7-26 (7D, 6D)
1A5A1A2R86		RESISTOR: see item 49	7-26 (19C)
1A5A1A2RA1		HEATSINK, ELECTRICAL, ELECTRONIC: TO-5 press-on, black anodize, .75 in. x .40 in. high, mfr 13103, part no. 2225B	7-26 (2C)
1A5A1A2T1		TRANSFORMER, RADIO FREQUENCY: toroidal tapped, 4 leads no. 29 sns wire, 16 turns closewound clockwise, 23 µH, mfr 14632, part no. 22295-69	7-26 (7D)
1A5A1A2U1		INTEGRATED CIRCUIT: divider, divide by 10/11, 0.2 to 1 GHz, ceramic 16 pin dual in line, mfr 04713, part no. MC12013L	7-26 (17H)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2U2		INTEGRATED CIRCUIT: TTL/S/100 MHz presettable decade and binary count, dip 14 pin, mfr 01295, part no. SN74S196N	7-26 (15H)
1A5A1A2U3		INTEGRATED CIRCUIT: counter control logic mecl, ceramic dip 16 pin, mfr 04713, part no. MC12014L	7-26 (16F)
1A5A1A2U4		INTEGRATED CIRCUIT: programmed N82S123B, 256 bit bipolar programmable ROM (32 x 8 ROM) 16 pin plastic dip, mfr 14632, part no. 841013	7-26 (12D)
1A5A1A2U5		INTEGRATED CIRCUIT: see item 29	7-26 (11F)
1A5A1A2U6		INTEGRATED CIRCUIT: quad 2 input nand 14 pin dip, mfr 14632, part no. 867400	7-26 (13G)
1A5A1A2U7		INTEGRATED CIRCUIT: general purpose low burst noise op amp, 8 lead T0-5 hermetically sealed case, mfr 02735, part no. CA6741T	7-26 (12G)
1A5A1A2U8		INTEGRATED CIRCUIT: see item 30	7-26 (18F)
1A5A1A2U9		INTEGRATED CIRCUIT: see item 31	7-26 (12E)
1A5A1A2U10, 1A5A1A2U11		INTEGRATED CIRCUIT: see item 30	7-26 (15D, 14D)
1A5A1A2U12		INTEGRATED CIRCUIT: TTL flip-flop with preset and clear, 14 pin dual in line, mfr 01295, part no. SN74S74N	7-26 (14F)
1A5A1A2U13		INTEGRATED CIRCUIT: TTL/BCD to binary, 16 pin dual in line, mfr 01295, part no. SN74184N	7-26 (16D)
1A5A1A2U14		INTEGRATED CIRCUIT: temp comp crystal osc 2 MHz $\pm 2 \times 10^{-6}$ 0 deg C to 70 deg C, 4 pin, 2.00 in. long by .98 in. wide by .50 in. high mfr 14632, part no. 841043	7-26 (9H)
1A5A1A2U15		INTEGRATED CIRCUIT: see item 31	7-26 (8F)
1A5A1A2U16		INTEGRATED CIRCUIT: dual line receiver, single 5 v supply ±100 mv sensitivity, TTL outputs, dual in line 8 pin, mfr 01295, part no SN75140N	7-26 (7F)
1A5A1A2U17 Thru 1A5A1A2U20		INTEGRATED CIRCUIT: see item 31	7-26 (9F, 4C, 5C, 6C)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2U21		INTEGRATED CIRCUIT: dual D-type pos-edge-trig flip flop w/preset and clear, 14 pin dual in line, mfr 01295, part no. SN74LS74N	7-26 (4G)
1A5A1A2U22		INTEGRATED CIRCUIT: see item 29	7-26 (3H)
1A5A1A2U23		INTEGRATED CIRCUIT: quadruple buss buffer gates w/three state outputs, 14 pin dual in line, mfr 01295, part no. SN74125N	7-26 (5D)
1A5A1A2U24		INTEGRATED CIRCUIT: quadruple 2-input positive NOR gates 5 NS/2 mW, 14 pin dual in line, mfr 01295, part no. SN74LS02N	7-26 (10D)
1A5A1A2VR1		VOLTAGE REGULATOR: fixed pos 5 V 0.5A T0-5 package, mfr 07263, part no. 78M05HC	7-26 (3C)
1A5A1A2Y1		CRYSTAL UNIT, QUARTZ: 11.155 MHz miniature holder w/wire leads, case type HC-18/U, mfr 80058, part no. CR64U 11.155 MHz	7-26 (5F)
1A5A2		CIRCUIT CARD ASSEMBLY: 2nd lo synthesizer etched circuit board, the 2nd lo tunes from 32.20001 to 32.21000 mHz in 10 Hz steps, and uses 3 phase lock loops to produce the 2nd lo output, 0.80 in. thk by 8.80 in. long by 3.85 in. wide, connected by plugging in, mfr 14632, part no. 791601-2	7-2 Sh 2 (65)
1A5A2C1, 1A5A2C2		CAPACITOR: see item 10	7-27 (15C, 12B)
1A5A2C3		CAPACITOR: see item 7	7-27 (10D)
1A5A2C4		CAPACITOR: see item 5	7-27 (19C)
1A5A2C5		CAPACITOR, FIXED, ELECTROLYTIC: 1 µF, 20 pct, 35 v, solid tantalum, mfr 56289, part no. 196D105X0035HE3	7-27 (18C)
1A5A2C6		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2200 pF, 10 pct, 200 v, mfr 81349, part no. CK06BX222K	7-27 (18D)
1A5A2C7		CAPACITOR: see item 5	7-27 (18F)
1A5A2C8		CAPACITOR: see item 7	7-27 (18H)

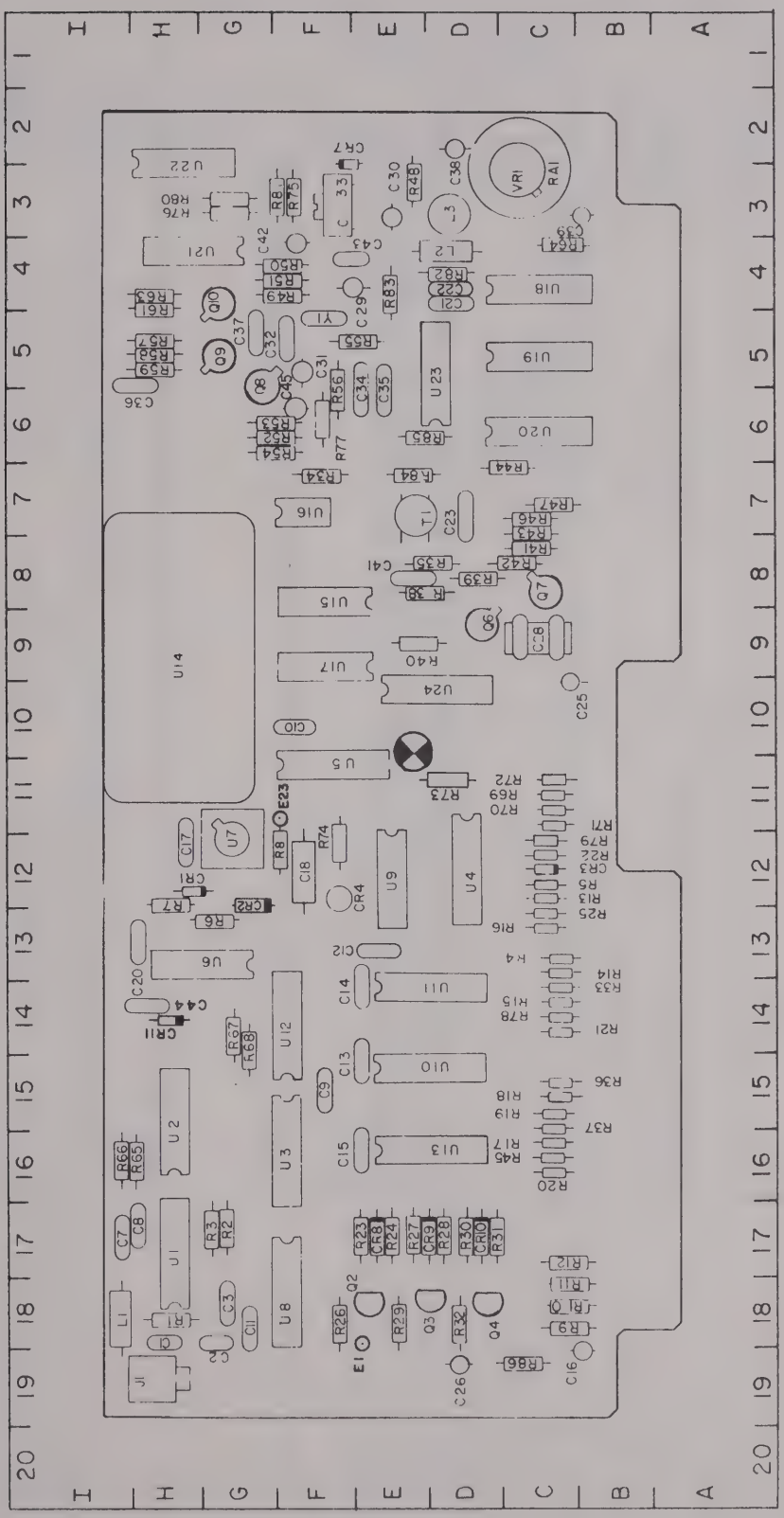


Figure 7-26. 1st and 3rd Lo Synthesizer/Time Base 791600-4 (1A5A1A2)

PARTS LOCATION INDEX
ASSEMBLY 1A5A1A2

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	18H	CR10	17D	R23	17E	R70	11C
C2	18G	CR11	14H	R24	17E	R71	11C
C3	18G	E1	19E	R25	13C	R72	11C
C7	17I	J1	19H	R26	18F	R73	11D
C8	17H	L1	18I	R27	17E	R74	12F
C9	15F	L2	4D	R28	17D	R75	3F
C10	10F	L3	3D	R29	18E	R76	3G
C11	18G	MP1	UNDER Q6	R30	17D	R77	6F
C12	13E	MP2	UNDER Q7	R31	17C	R78	14C
C13	15E	MP3	UNDER Q8	R32	17C	R79	12C
C14	14E	MP4	UNDER Q9	R33	14C	R80	3G
C15	16E	MP5	UNDER Q10	R34	7F	R81	3F
C16	19B	MP6	UNDER U7	R35	8D	R82	4D
C17	12H	MP7	UNDER VR1	R36	15C	R83	4E
C18	12F	MP8	10E	R37	15C	R84	7D
C20	13H	Q2	18E	R38	8D	R85	6D
C21	4D	Q3	18E	R39	8D	R86	19C
C22	4D	Q4	18D	R40	9D	RA1	2C
C23	7D	Q6	9D	R41	8C	T1	7D
C25	10C	Q7	8C	R42	8C	U1	17H
C26	19D	Q8	6G	R43	7C	U2	15H
C28	9C	Q9	5G	R44	7C	U3	16F
C29	4D	Q10	4G	R45	16C	U4	12D
C30	3E	R1	18H	R46	7C	U5	11F
C31	5F	R2	17G	R47	7C	U6	13G
C32	5F	R3	17G	R48	3E	U7	12G
C33	3F	R4	13C	R49	4F	U8	18F
C34	6E	R5	12C	R50	4F	U9	12E
C35	6E	R6	13G	R51	4F	U10	15D
C36	5H	R7	12H	R52	6F	U11	14D
C37	5G	R8	12F	R53	6F	U12	14F
C38	2D	R9	18C	R54	6F	U13	16D
C39	2D	R10	18C	R55	5E	U14	9H
C41	8E	R11	18C	R56	6F	U15	8F
C42	4F	R12	17C	R57	5H	U16	7F
C43	4E	R13	12C	R58	5H	U17	9F
C44	14H	R14	13C	R59	5H	U18	4C
C45	6F	R15	14C	R61	4H	U19	5C
CR1	12H	R16	13C	R63	4H	U20	6C
CR2	12G	R17	16C	R64	4C	U21	4G
CR3	12C	R18	15C	R65	16H	U22	3H
CR4	12F	R19	15C	R66	16I	U23	5D
CR7	3E	R20	16C	R67	14G	U24	10D
CR8	17E	R21	14C	R68	14G	VR1	3C
CR9	17D	R22	12C	R69	11C	Y1	5F

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C9		CAPACITOR, FIXED, MICA, DIELECTRIC: 12 pF, 5 pct, 500 v, mfr 81349, part no. CM05CD120J03	7-27 (17E)
1A5A2C10		CAPACITOR: see item 12	7-27 (14F)
1A5A2C11, 1A5A2C12		CAPACITOR: see item 10	7-27 (15F, 15B)
1A5A2C13		CAPACITOR: see item 12	7-27 (15C)
1A5A2C14, 1A5A2C15		CAPACITOR: see item 5	7-27 (14C, 11C)
1A5A2C16		CAPACITOR: see item 2	7-27 (12C)
1A5A2C17		CAPACITOR, FIXED, ELECTROLYTIC: 150 µF, 20 pct, 6 v, solid tantalum, mfr 56289, part no. 196D157X0006PE4	7-27 (11C)
1A5A2C18		CAPACITOR: see item 7	7-27 (11D)
1A5A2C19 Thru 1A5A2C21		CAPACITOR: see item 10	7-27 (11E, 15G, 15H
1A5A2C22		CAPACITOR, FIXED, CERAMIC: tubular 10 pF, 0.5 pF tol 500 v, npo, mfr 72982, part no. 301-000C0H0-100D	7-27 (14H)
1A5A2C23		CAPACITOR: same as 1A5A1A2C34	7-27 (14G)
1A5A2C24		CAPACITOR: see item 10	7-27 (14H)
1A5A2C25		CAPACITOR: same as 1A5A1C5	7-27 (13D)
1A5A2C26 Thru 1A5A2C28		CAPACITOR: see item 5	7-27 (15D, 10C, 3C)
1A5A2C29		CAPACITOR, FIXED, PLASTIC DIELECTRIC: .022 µF, 5 pct, 100 v, .187 in. dia body by .50 in. long, mfr 84411, part no. 663UW223-5-1W	7-27 (7E)
1A5A2C30		CAPACITOR: same as 1A5A1A2C18	7-27 (9D)
1A5A2C31		Not Used	
1A5A2C32		CAPACITOR: see item 5	7-27 (10E)
1A5A2C33, 1A5A2C34		CAPACITOR: see item 2	7-27 (4G)
1A5A2C35		CAPACITOR: see item 10	7-27 (3E)
1A5A2C36		CAPACITOR: see item 1	7-27 (3E)
1A5A2C37		CAPACITOR: see item 5	7-27 (10E)
1A5A2C38, 1A5A2C39		CAPACITOR: see item 1	7-27 (15D, 14H)
1A5A2C40		CAPACITOR: see item 10	7-27 (10C)
1A5A2C41		CAPACITOR: see item 1	7-27 (14D)
1A5A2C42		Not Used	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C43 Thru 1A5A2C49		CAPACITOR: see item 10	7-27 (7D, 7H, 4G, 4E, 5E, 16F, 17F)
1A5A2C50		CAPACITOR, FIXED, CERAMIC: tubular 27 pF, 5 pct, 500 v, npo, mfr 72982, part no. 308-000C0G0-270J	7-27 (17F)
1A5A2C51		CAPACITOR, VARIABLE, AIR DIELECTRIC: .4 - 2.5 pF, 500 v, .21 in. high by .118 in. dia w/.005 x .05 lead .11 off cent of body, mfr 91293, part no. 7283	7-27 (17H)
1A5A2C52		CAPACITOR, FIXED, CERAMIC: tubular 6.8 pF, .25 pF tol 500 v npo, mfr 72982, part no. 301-000C0H0-689C	7-27 (17G)
1A5A2C53, 1A5A2C54		CAPACITOR: see item 8	7-27 (16G, 16H)
1A5A2C55		CAPACITOR: see item 1	7-27 (17I)
1A5A2C56		CAPACITOR, FIXED, CERAMIC: tubular 8.2 pF, .5 pF tol 500 v npo, mfr 72982, part no. 301-000C0H0-829D	7-27 (17G)
1A5A2C57	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 5.1 pF, 0.5 pF tol, 500 v npo, mfr 72982, part no. 301-000C0H0-519D	7-27 (17G)
1A5A2C57	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 5.6 pF, 05 pF tol 500 v N470, mfr 72982, part no. 301-000T2J0-569D	7-27 (17G)
1A5A2C57	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 6.0 pF, 0.5 pF tol, 500 v npo, mfr 72982, part no. 301-000U2J0-609D	7-27 (17G)
1A5A2C58		CAPACITOR: see item 10	7-27 (12F)
1A5A2C59		CAPACITOR, FIXED, CERAMIC: tubular 33 pF, 5 pct, pct, 500 v npo, mfr 72982, part no. 308-000C0G0-330J	7-27 (13F)
1A5A2C60		CAPACITOR: see item 8	7-27 (12F)
1A5A2C61		CAPACITOR: same as 1A5A2C51	7-27 (12H)
1A5A2C62		CAPACITOR: same as 1A5A2C52	7-27 (13G)
1A5A2C63, 1A5A2C64		CAPACITOR: see item 8	7-27 (12G, 12H)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C65		CAPACITOR: see item 1	7-27 (13I)
1A5A2C66	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 2.4 pF, .25 pF tol, 500 v npo, mfr 72982, part no. 301-000C0J0-249C	7-27 (13G)
1A5A2C66	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 2.7 pF, .25 pF tol, 500 v npo, mfr 72982, part no. 301-000C0J0-279C	7-27 (13G)
1A5A2C66	Note 1	CAPACITOR, FIXED, CERAMIC: tubular 2.9 pF, .25 pF tol, 500 v npo, mfr 72982, part no. 301-000C0J0-299C	7-27 (13G)
1A5A2C67		CAPACITOR, FIXED, CERAMIC: tubular 5.6 pF, 0.5 pF tol, 500 v, mfr 72982, part no. 301-000U2J0-569D	7-27 (13G)
1A5A2C68		CAPACITOR: same as 1A2A1C6	7-27 (8F)
1A5A2C69		CAPACITOR: same as 1A3A1C16	7-27 (8G)
1A5A2C70		CAPACITOR, FIXED, CERAMIC: tubular 2.2 pF, .25 pF tol, 500 v npo, mfr 72982, part no. 301-000C0J0-229C	7-27 (7G)
1A5A2C71		CAPACITOR, FIXED, CERAMIC: tubular 15 pF, 5 pct, npo, mfr 72928, part no. 301-000C0G0-150J	7-27 (8G)
1A5A2C72		CAPACITOR, FIXED, MICA DIELECTRIC: 1000 pF, 5 pct, 100 v, mfr 72136, part no. DM15-102J	7-27 (12C)
1A5A2C73		CAPACITOR: see item 1	7-27 (8F)
1A5A2C74		CAPACITOR: see item 10	7-27 (11C)
1A5A2C75		CAPACITOR: same as 1A5A1A1A1C15	7-27 (8C)
1A5A2CR1		SEMICONDUCTOR: same as 1A5A1A2CR4	7-27 (6E)
1A5A2CR2		SEMICONDUCTOR: same as 1A3A1CR1	7-27 (13D)
1A5A2CR3		SEMICONDUCTOR, DEVICE, DIODE: varicap, silicon planar capacitance diode, forward current 50 mA, capacitance ratio 5 - 6.5, flat leads, 4 mm long body by 2.5 mm wide, mfr 25088, part no. BB109-yellow	7-27 (17F)
1A5A2CR4, 1A5A2CR5		SEMICONDUCTOR: same as 1A5A2CR3	7-27 (12F, 8F)
1A5A2CR6		SEMICONDUCTOR: same as 1A5A1A2CR4	7-27 (6E)
	Note 1.	Nominal value, final value factory selected. (Refer to paragraph 6-7g)	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2L1		COIL, RADIO FREQUENCY: fixed molded .47 µH, 10 pct, iron core, .375 in. long by .156 in. dia, mfr 99800, part no. 1537-06	7-27 (19F)
1A5A2L2		COIL: same as 1A4A1L1	7-27 (14G)
1A5A2L3		Not Used	
1A5A2L4		COIL, RADIO FREQUENCY: 22 mH, 10 pct, pc mount, .375 in. dia by .375 in. wide, .025 dia tinned leads, mfr 71279, part no. 553-3635-53	7-27 (9C)
1A5A2L5		COIL, RADIO FREQUENCY: molded, 680 µH, 5 pct, iron core, .440 in. long by .19 in. dia, mfr 99800, part no. 2500-20	7-27 (14C)
1A5A2L6, 1A5A2L7		COIL: same as 1A5A1L2	7-27 (17G, 12G)
1A5A2L8		COIL, RADIO FREQUENCY: no. 22 sns 3 turns evenly spaced clockwise on QSA 140-250 coil form, mfr 14632, part no 21210-183	7-27 (9G)
1A5A2L9		COIL, RADIO FREQUENCY: molded 2.2 µH, 10 pct iron core, .250 in. long by .095 in. dia, mfr 99800, part no. 1025-28	7-27 (16E)
1A5A2L10		COIL, RADIO FREQUENCY: 10 µH, 10 pct, pc mount, .375 in. dia by .375 in. wide, .025 dia tinned leads, mfr 71279, part no. 553-3635-13	7-27 (3D)
1A5A2L11		COIL: same as 1A4A2L1	7-27 (10F)
1A5A2MP1 Thru 1A5A2MP3		INSULATOR: see item 24 (3)	7-27 (UNDER Q1-Q3)
1A5A2MP4 Thru 1A5A2MP6		INSULATOR: see item 25 (3)	7-27 (UNDER Q5-Q7)
1A5A2MP7		PRINTED CIRCUIT BOARD: basic etched board less the assembled parts for item 1A5A2.	7-27 (10E)
1A5A2Q1		TRANSISTOR: see item 64	7-27 (18D)
1A5A2Q2		TRANSISTOR: see item 63	7-27 (12C)
1A5A2Q3		TRANSISTOR: see item 67	7-27 (15H)
1A5A2Q4		Not Used	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2Q5, 1A5A2Q6		TRANSISTOR: see item 64	7-27 (17H, 13H)
1A5A2Q7		TRANSISTOR: same as 1A5A1A1A1Q1	7-27 (3D)
1A5A2R1 Thru 1A5A2R3		RESISTOR: see item 45	7-27 (16C, 13B, 10D)
1A5A2R4		RESISTOR: same as 1A3A2R4	7-27 (18C)
1A5A2R5		RESISTOR: see item 35	7-27 (18C)
1A5A2R6		RESISTOR: see item 37	7-27 (19C)
1A5A2R7		RESISTOR: see item 40	7-27 (18C)
1A5A2R8		RESISTOR: see item 35	7-27 (18G)
1A5A2R9		RESISTOR: see item 37	7-27 (19D)
1A5A2R10		RESISTOR, FIXED, COMPOSITION: 5.6 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G5R6JS	7-27 (16D)
1A5A2R11		RESISTOR, FIXED, COMPOSITION: 5.1 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G512JS	7-27 (19E)
1A5A2R12		RESISTOR: see item 37	7-27 (18E)
1A5A2R13		RESISTOR: see item 35	7-27 (18G)
1A5A2R14		RESISTOR: see item 37	7-27 (15F)
1A5A2R15 Thru 1A5A2R18		RESISTOR: see item 54	7-27 (15E, 14F, 15F)
1A5A2R19		RESISTOR: same as 1A4A6R47	7-27 (15E)
1A5A2R20, 1A5A2R21		RESISTOR: see item 47	7-27 (14D)
1A5A2R22		RESISTOR: see item 36	7-27 (14C)
1A5A2R23		RESISTOR: same as 1A4A10R17	7-27 (13C)
1A5A2R24, 1A5A2R25		RESISTOR: see item 37	7-27 (13C)
1A5A2R26		RESISTOR: see item 35	7-27 (11C)
1A5A2R27		RESISTOR: see item 50	7-27 (11E)
1A5A2R28		RESISTOR: see item 35	7-27 (11C)
1A5A2R29		RESISTOR: see item 37	7-27 (11D)
1A5A2R30		RESISTOR: see item 49	7-27 (11E)
1A5A2R31		RESISTOR: same as 1A4A8R34	7-27 (15G)
1A5A2R32		RESISTOR, FIXED, COMPOSITION: 820 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G824JS	7-27 (15G)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2R33		RESISTOR: see item 39	7-27 (14G)
1A5A2R34		RESISTOR, FIXED, COMPOSITION: 360 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G361JS	7-27 (14G)
1A5A2R35		RESISTOR: see item 50	7-27 (11E)
1A5A2R36		RESISTOR: see item 35	7-27 (13D)
1A5A2R37		RESISTOR: same as 1A3A2R12	7-27 (16C)
1A5A2R38		RESISTOR: see item 35	7-27 (12C)
1A5A2R39		RESISTOR: same as 1A4A1R51	7-27 (18E)
1A5A2R40		RESISTOR: see item 55	7-27 (7E)
1A5A2R41		RESISTOR: see item 37	7-27 (8D)
1A5A2R42		RESISTOR: see item 38	7-27 (8C)
1A5A2R43		Not Used	
1A5A2R44		RESISTOR: see item 57	7-27 (9E)
1A5A2R45		Not Used	
1A5A2R46		RESISTOR: see item 43	7-27 (9E)
1A5A2R47		RESISTOR, FIXED, COMPOSITION: 750 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia mfr 81349, part no. RCR07G751JS	7-27 (9D)
1A5A2R48, 1A5A2R49		RESISTOR: see item 54	7-27 (5G)
1A5A2R50, 1A5A2R51		RESISTOR: see item 55	7-27 (3E, 4E)
1A5A2R52, 1A5A2R53		RESISTOR: see item 37	7-27 (2F, 5I)
1A5A2R54, 1A5A2R55		RESISTOR: see item 55	7-27 (5H, 5G)
1A5A2R56 Thru 1A5A2R58		Not Used	
1A5A2R59		RESISTOR: see item 54	7-27 (14H)
1A5A2R60, 1A5A2R61		RESISTOR: see item 37	7-27 (8C, 15G)
1A5A2R62, 1A5A2R63		RESISTOR: see item 38	7-27 (18C, 9B)
1A5A2R64		RESISTOR, FIXED, COMPOSITION: 10 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G103JS	7-27 (17E)
1A5A2R65, 1A5A2R66		RESISTOR: same as 1A4A8R54	7-27 (17H)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2R67		RESISTOR, FIXED, COMPOSITION: 22 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G220JS	7-27 (17H)
1A5A2R68		RESISTOR, FIXED, FILM: 3.92 k ohms, 1 pct, 0.10 w, 200 v rated, .250 in. long body by .088 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C3921F	7-27 (17H)
1A5A2R69		RESISTOR: same as 1A5A2R64	7-27 (12E)
1A5A2R70, 1A5A2R71		RESISTOR: same as 1A4A8R54	7-27 (13H, 12H)
1A5A2R72		RESISTOR: same as 1A5A2R67	7-27 (13H)
1A5A2R73		RESISTOR: same as 1A5A2R68	7-27 (13H)
1A5A2R74		RESISTOR: see item 46	7-27 (8F)
1A5A2R75		RESISTOR: see item 45	7-27 (9F)
1A5A2R76		RESISTOR: same as 1A5A2R64	7-27 (8F)
1A5A2R77		Not Used	
1A5A2R78		RESISTOR: see item 54	7-27 (7G)
1A5A2R79		RESISTOR: see item 38	7-27 (7E)
1A5A2R80		RESISTOR: see item 37	7-27 (15D)
1A5A2U1		INTEGRATED CIRCUIT: see item 29	7-27 (17C)
1A5A2U2		INTEGRATED CIRCUIT: 35 MHz presettable decade and binary counter/latch, divided by (2, 4, 8, 16) 14 pin dual in line plastic, mfr 01295, part no. SN74177N	7-27 (17C)
1A5A2U3		INTEGRATED CIRCUIT: same as 1A5A1A2U12	7-27 (17D)
1A5A2U4		INTEGRATED CIRCUIT: double balanced modulator/demodulator, 10 pin metal can, mfr 07263, part no. 796HC	7-27 (15F)
1A5A2U5		INTEGRATED CIRCUIT: differential ampl 10 pin TO-5 header, short can, pin 5 connected to case, mfr 18324, part no. N5733K	7-27 (15C)
1A5A2U6		INTEGRATED CIRCUIT: see item 29	7-27 (12D)
1A5A2U7		INTEGRATED CIRCUIT: see item 30	7-27 (5D)
1A5A2U8		INTEGRATED CIRCUIT: synchronous up/down counter w/down/up mode control, counts 8-4-2-1 bcd or binary, presettable with load control, 16 pin dip plastic, mfr 01295, part no. SN74LS191N	7-27 (4D)

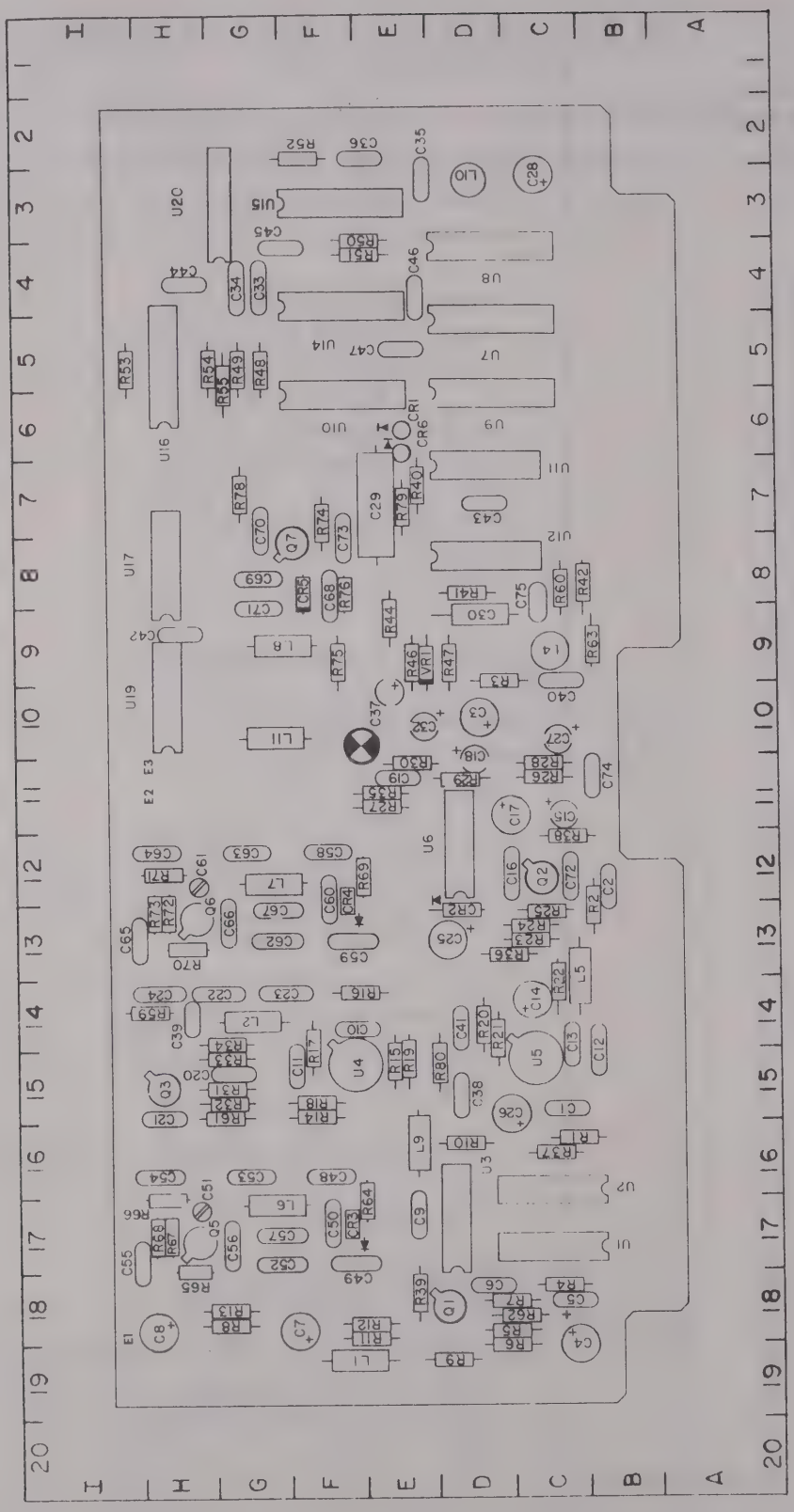


Figure 7-27. 2nd Lo Synthesizer 791601-2 (1A5A2)

PARTS LOCATION INDEX
ASSEMBLY 1A5A2

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	15C	C35	3E	C68	8F	Q3	15H	R30	11E	R68	17H
C2	12B	C36	3E	C69	8G	Q5	17H	R31	15G	R69	12E
C3	10D	C37	10E	C70	7G	Q6	13H	R32	15G	R70	13H
C4	19C	C38	15D	C71	8G	Q7	3D	R33	14G	R71	12H
C5	18C	C39	14H	C72	12C	R1	16C	R34	14G	R72	12H
C6	18D	C40	10C	C73	8F	R2	13B	R35	11E	R73	13H
C7	18F	C41	14D	C74	11C	R3	10D	R36	13D	R74	8F
C8	18H	C43	7D	C75	8C	R4	18C	R37	16C	R75	9F
C9	17E	C43	7D	CR1	6E	R5	18C	R38	12C	R76	8F
C10	14F	C44	4H	CR2	13D	R6	19C	R39	18E	R78	7G
C11	15F	C45	4G	CR3	17F	R7	18C	R40	7E	R79	7E
C12	15B	C46	4E	CR4	12F	R8	18G	R41	8D	R80	15D
C13	15C	C47	5E	CR5	8F	R9	19D	R42	8C	U1	17C
C14	14C	C48	16F	CR6	6E	R10	16D	R44	9E	U2	17C
C15	11C	C49	17F	L1	19F	R11	19E	R46	9E	U3	17D
C16	12C	C50	17F	L2	14G	R12	18E	R47	9D	U4	15F
C17	11C	C51	17H	L4	9C	R13	18G	R48	5G	U5	15C
C18	11D	C52	17G	L5	14C	R14	15F	R49	5G	U6	12D
C19	11E	C53	16G	L6	17G	R15	15E	R50	3E	U7	5D
C20	15G	C54	16H	L7	12G	R16	14F	R51	4E	U8	4D
C21	15H	C55	17I	L8	9G	R17	14F	R52	2F	U9	6D
C22	14H	C56	17G	L9	16E	R18	15F	R53	5I	U10	6F
C23	14G	C57	17G	L10	3D	R19	15E	R54	5H	U11	7D
C24	14H	C58	12F	L11	10F	R20	14D	R55	5G	U12	8D
C25	13D	C59	13F	MP1	UNDER Q1	R21	14D	R59	14H	U14	5F
C26	15D	C60	12F	MP2	UNDER Q2	R22	14C	R60	8C	U15	3F
C27	10C	C61	12H	MP3	UNDER Q3	R23	13C	R61	15G	U17	8H
C28	3C	C62	13G	MP4	UNDER Q5	R24	13C	R62	18C	U19	10H
C29	7E	C63	12G	MP5	UNDER Q6	R25	13C	R63	9B	U20	3G
C30	9D	C64	12H	MP6	UNDER Q7	R26	11C	R64	17E	VR1	9D
C32	10E	C65	13I	MP7	10E	R27	11E	R65	17H		
C33	4G	C66	13G	Q1	18D	R28	11C	R66	17H		
C34	4G	C67	13G	Q2	12C	R29	11D	R67	17H		

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2U9, 1A5A2U10		INTEGRATED CIRCUIT: same as 1A5A2U8	7-27 (6D, 6F)
1A5A2U11		INTEGRATED CIRCUIT: quadruple 2 input positive-nand gates, 14 pin dip plastic, mfr 01295, part no. SN74LS00N	7-27 (7D)
1A5A2U12		INTEGRATED CIRCUIT: see item 29	7-27 (8D)
1A5A2U13		Not Used	
1A5A2U14		INTEGRATED CIRCUIT: TTL synchronous 4 bit up/down counter, 35 MHz, 100 mW, 16 pin dip plastic, mfr 01295, part no. SN74LS168N	7-27 (5F)
1A5A2U15		INTEGRATED CIRCUIT: divider, divide by 10/11, 0.2 to 1 GHz, 600 MHz toggle freq, 16 pin dip plastic, mfr 04713, part no. MC12013P	7-27 (3F)
1A5A2U16		INTEGRATED CIRCUIT: same as 1A5A2U15	7-27 (5H)
1A5A2U17		INTEGRATED CIRCUIT: see item 31	7-27 (8H)
1A5A2U18		Not Used	
1A5A2U19		INTEGRATED CIRCUIT: see item 31	7-27 (10H)
1A5A2U20		INTEGRATED CIRCUIT: same as 1A5A2U11	7-27 (3G)
1A5A2VR1		SEMICONDUCTOR DEVICE, DIODE: zener 8.2 v silicon, mfr 80131, part no. 1N756A	7-27 (9D)
1A5A3		CIRCUIT CARD ASSEMBLY: bfo synthesizer, etched circuit board, bfo synthesizer produces a 455 kHz ±8.9 kHz signal. The bfo tunes from 446.1 to 463.9 kHz in 100 Hz steps, 0.500 in. thk by 4.30 in. long by 3.85 in. wide, connected by plugging in, mfr 14632, part no. 791576-2	7-2 Sh 2 (72)
1A5A3C1		CAPACITOR, FIXED, ELECTROLYTIC: 3.3 µF, 20 pct, 35 v tantalex, mfr 56289, part no. 196D335X0035JE3	7-28 (3G)
1A5A3C2		CAPACITOR: see item 12	7-28 (3G)
1A5A3C3		CAPACITOR: see item 7	7-28 (4G)
1A5A3C4		CAPACITOR: see item 10	7-28 (5H)
1A5A3C5		CAPACITOR: see item 11	7-28 (5G)
1A5A3C6		CAPACITOR: same as 1A5A2C59	7-28 (5G)
1A5A3C7		CAPACITOR: see item 8	7-28 (6F)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3C8		CAPACITOR: same as 1A5A1A2C33	7-28 (7G)
1A5A3C9		CAPACITOR: see item 11	7-28 (7H)
1A5A3C10		CAPACITOR, FIXED, MICA DIELECTRIC: 10 pF, 0.5 pF tol, 500 v, mfr 81349, part no. CM04CD100D03	7-28 (7F)
1A5A3C11, 1A5A3C12		CAPACITOR: see item 1	7-28 (7H, 7F)
1A5A3C13		CAPACITOR: see item 11	7-28 (8H)
1A5A3C14		CAPACITOR: same as 1A5A3C10	7-28 (8H)
1A5A3C15		Not Used	
1A5A3C16		CAPACITOR: see item 7	7-28 (5B)
1A5A3C17 Thru 1A5A3C21		CAPACITOR: see item 11	7-28 (8E, 6E, 3B, 3D, 9H)
1A5A3C22		CAPACITOR: see item 7	7-28 (4F)
1A5A3C23		CAPACITOR: see item 11	7-28 (8H)
1A5A3CR1		SEMICONDUCTOR: same as 1A5A2CR8	7-28 (5F)
1A5A3L1		COIL, RADIO FREQUENCY: 27 µH, 5 pct, .375 in. long by .156 in. dia by .025 in. lead dia phenolic core molded, mfr 99800, part no. 1537-48	7-28 (6H)
1A5A3L2		COIL, RADIO FREQUENCY: 330 µH, 5 pct, molded iron core, .440 in. long by .19 in. dia, mfr 99800, part no. 2500-04	7-28 (8H)
1A5A3L3		COIL: same as 1A5A1L2	7-28 (10G)
1A5A3MP1 Thru 1A5A3MP4		INSULATOR: see item 26	7-28 (UNDER Q1-Q4)
		(Attaching Hardware)	
		STANDOFF: 4-40 x 3/16 long cres .213 mtg hole, mfr 46384, part no. SOS6440-6 (4), G(4), C(4), A(4)	
1A5A3MP5		PRINTED CIRCUIT BOARD: basic etched circuit less the assembled parts for item 1A5A3, mfr 14632, part no. 791576P1	7-28 (6E)
1A5A3Q1		TRANSISTOR: see item 64	7-28 (6G)

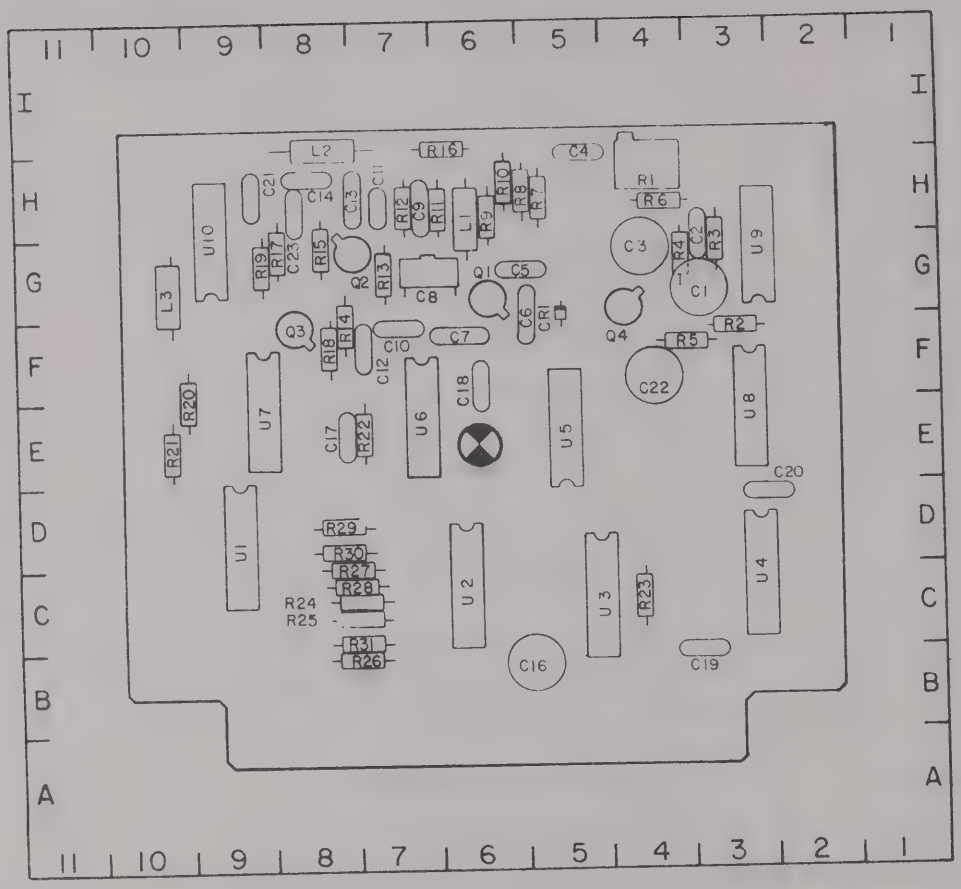


Figure 7-28. Bfo Synthesizer 791576-2 (1A5A3)

PARTS LOCATION INDEX
ASSEMBLY 1A5A3

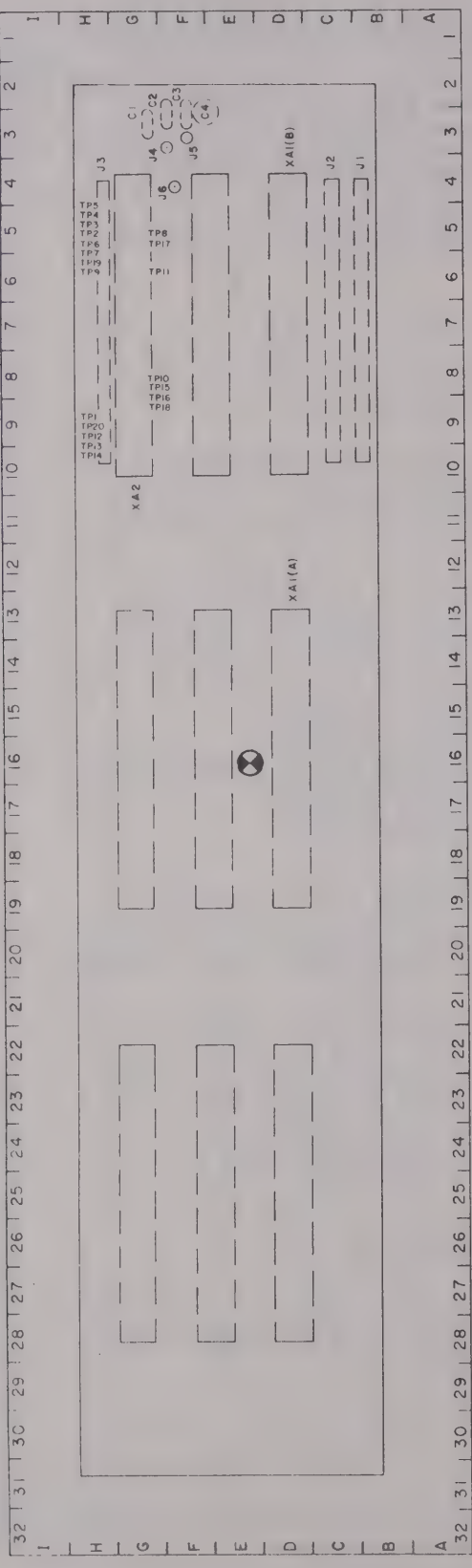
REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
C1	3G	C22	4F	R6	4H	R26	7B
C2	3G	C23	8H	R7	5H	R27	7C
C3	4G	CR1	5F	R8	5H	R28	7C
C4	5H	L1	6H	R9	6H	R29	8D
C5	5G	L2	8H	R10	6H	R30	8D
C6	5G	L3	10G	R11	6H	R31	7C
C7	6F	MP1	UNDER Q1	R12	7H	U1	9D
C8	7G	MP2	UNDER Q2	R13	7G	U2	6C
C9	7H	MP3	UNDER Q3	R14	8F	U3	5C
C10	7F	MP4	UNDER Q4	R15	8G	U4	3C
C11	7H	MP5	6E	R16	6H	U5	5E
C12	7F	Q1	6G	R17	8G	U6	7E
C13	8H	Q2	7G	R18	8F	U7	9E
C14	8H	Q3	8F	R19	9G	U8	3E
C16	5B	Q4	4G	R20	10E	U9	3G
C17	8E	R1	4H	R21	10E	J10	9G
C18	6E	R2	3F	R22	7E		
C19	3B	R3	3G	R23	4C		
C20	3D	R4	4G	R24	7C		
C21	9H	R5	4F	R25	7C		

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3Q2		TRANSISTOR: silicon dual insulated, gate field-effect w/integrated gate protection, for rf ampl, mixer and if. ampl, N-channel depletion type, hermetically sealed in T0-72 package, mfr 14632, part no. 841001-2 (RCA P/N 3N200)	7-28 (7G)
1A5A3Q3		TRANSISTOR: same as 1A5A1A2Q6	7-28 (8F)
1A5A3Q4		TRANSISTOR: MOS/field effect, N-channel, vhf amplifier, T0-72 case, mfr 80131, part no. 3N128	7-28 (4G)
1A5A3R1		RESISTOR, VARIABLE: 500-ohm, 10 pct .5 w, helitrim sealed metal housing 1/4 in. dia, single turn, 3 pin, mfr 73138, part no. 62PAR500	7-28 (4H)
1A5A3R2		RESISTOR: see item 37	7-28 (3F)
1A5A3R3		RESISTOR: see item 38	7-28 (3G)
1A5A3R4		RESISTOR: see item 37	7-28 (4G)
1A5A3R5		RESISTOR: see item 35	7-28 (4F)
1A5A3R6		RESISTOR: see item 37	7-28 (4H)
1A5A3R7		RESISTOR: see item 38	7-28 (5H)
1A5A3R8		RESISTOR, FIXED, FILM: 4.22 k ohms, 1 pct, 0.10 w, 200 v rated, .250 in. long body by .088 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C4221F	7-28 (5H)
1A5A3R9		RESISTOR, FIXED, FILM: 17.8 k ohms, 1 pct, 0.10 w, 200 v rated, .250 in. long body by .088 in. dia by .02 in. lead dia, mfr 81349, part no. RN55C1782F	7-28 (6H)
1A5A3R10		RESISTOR: same as 1A5A3R9	7-28 (6H)
1A5A3R11		RESISTOR: see item 35	7-28 (6H)
1A5A3R12		RESISTOR: see item 58	7-28 (7H)
1A5A3R13		RESISTOR: see item 39	7-28 (7G)
1A5A3R14		RESISTOR: same as 1A4A8R34	7-28 (8F)
1A5A3R15		RESISTOR: same as 1A5A2R32	7-28 (8G)
1A5A3R16		RESISTOR: see item 35	7-28 (6H)
1A5A3R17		RESISTOR: see item 38	7-28 (8G)
1A5A3R18, 1A5A3R19		RESISTOR: see item 37	7-28 (8F, 9G)
1A5A3R20		RESISTOR: same as 1R2	7-28 (10E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3R21		RESISTOR, FIXED, COMPOSITION: 62 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G620JS	7-28 (10E)
1A5A3R22 Thru 1A5A3R31		RESISTOR: see item 37	7-28 (7E, 4C, 7C, 7B, 8D)
1A5A3U1 Thru 1A5A3U4		INTEGRATED CIRCUIT: see item 30	7-28 (9D, 6C, 5C, 3C)
1A5A3U5		INTEGRATED CIRCUIT: positive-nor gates with totempole outputs, dual 4-input with strobe, 14 pin dual-in-line plastic, mfr 01295, part no. SN7425N	7-28 (5E)
1A5A3U6		INTEGRATED CIRCUIT: positive-and gate with totempole outputs, 3 input 5nS, 2 mV, 14 pin dual-in-line plastic, mfr 01295, part no. SN74LS11N	7-28 (7E)
1A5A3U7		INTEGRATED CIRCUIT: see item 29	7-28 (9E)
1A5A3U8		INTEGRATED CIRCUIT: dual d flip-flop positive edge triggered w/preset and clear, 14 pin dual-in-line plastic, mfr 14632, part no. 867474	7-28 (3E)
1A5A3U9		INTEGRATED CIRCUIT: same as 1A5A1A2U15	7-28 (3G)
1A5A3U10		INTEGRATED CIRCUIT: TTL/counter asynchronous 2 x 5, 14 pin dual-in-line, mfr 01295, part no. SN74LS90N	7-28 (9G)
1A6		CIRCUIT CARD ASSEMBLY: i/o motherboard, etched circuit board, provides support and interconnections for modules in the i/o section of the receiver 0.500 in. thk by 14.40 in. long by 3.10 in. wide, connected by push on tab, mfr 14632, part no. 791580-4	7-2b (61)
1A6C1 Thru 16C3		CAPACITOR: see item 10	7-29 (3G, 3F)
1A6C4		CAPACITOR, FIXED, ELECTROLYTIC: 100 µF, 20 pct, 20 v, .750 in. high by .40 in. dia, mfr 56289, part no. 196D107X0020TE4	7-29 (3E)
1A6J1		POST FEED THRU: 29 position comb, mfr 00779, part no. PE7-14045	7-29 (4B)



PARTS LOCATION INDEX
ASSEMBLY 1A6

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	3G	J4	3F
C2	3F	J5	3F
C3	3F	J6	4F
C4	3E	MP1	16E
J1	4B	XA1	13D, 4D
J2	4C	XA2	11G
J3	4H		

Figure 7-29. I/o Motherboard 791580-4 (1A6)

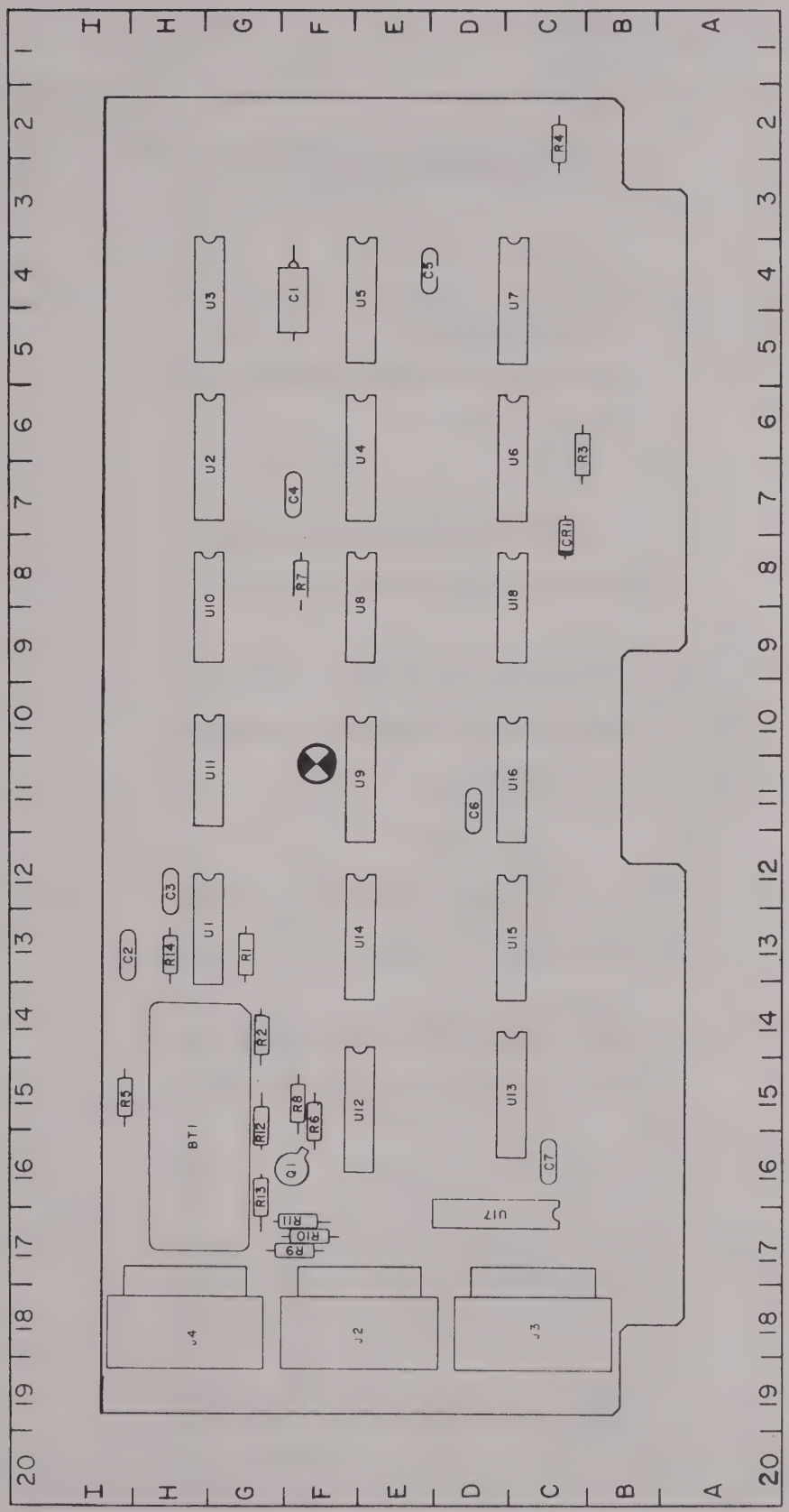


Figure 7-30. Manual Tuning/Up-Down Counter 791575-5 (1A6A1)

PARTS LOCATION INDEX
ASSEMBLY 1A6A1

REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION	REF DESIG	LOCATION
BT1	16H	MP2	UNDER BT1	R8	15F	U7	4C
C1	4F	MP3	UNDER BT1	R9	17F	U8	9E
C2	13I	MP4	UNDER BT1	R10	17F	U9	11E
C3	12H	MP5	UNDER Q1	R11	17F	U10	9H
C4	7F	MP6	11F	R12	16G	U11	11H
C5	4E	Q1	16F	R13	16G	U12	15E
C6	11D	R1	13G	R14	13H	U13	15C
C7	16C	R2	14G	U1	13H	U14	13E
CR1	8C	R3	6B	U2	7H	U15	13C
J2	18F	R4	2C	U3	5H	U16	11C
J3	18C	R5	15I	U4	7E	U17	17D
J4	18H	R6	15F	U5	5E	U18	8C
MP1	UNDER BT1	R7	8F	U6	7C		

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6J2, 1A6J3		POST FEED THRU: same as 1A6J1	7-29 (4C, 4H)
1A6J4 Thru 1A6J6		CONNECTOR: see item 21	7-29 (3F, 4F)
1A6MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A6, mfr 14632, part no. 791580P1	7-29 (16E)
		(Attaching Hardware)	
		G(8), C(8), A(8)	
1A6XA1, 1A6XA2		CONTACT STRIP: same as 1A4XA1	7-29 (13D, 4D, 11G)
1A6A1		CIRCUIT CARD ASSEMBLY: manual tune up/down counter, etched circuit board contains rf freq data, which is sent to the 1st and 2nd lo synthesizers and encoded for multiplexing to the display board, 0.500 in. thk by 8.80 in. long by 3.85 in. wide, plugs into connectors of the motherboard, mfr 14632, part no. 791575-5	7-2 Sh 2 (71)
1A6A1BT1		BATTERY, STORAGE: nickel cadium 2.4 v, 65 mA, pc mount, 4 mounting pins, 1.400 in. long by .67 in. wide by .60 in. high mfr 19209, part no. 41B901BD16G1	7-30 (16H)
1A6A1C1		CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 10 pct, 15 v, mfr 81349, part no. CS13BD226K	7-30 (4F)
1A6A1C2		CAPACITOR: see item 2	7-30 (13I)
1A6A1C3 Thru 1A6A1C7		CAPACITOR: see item 11	7-30 12H, 7F, 4E, 11D, 16C)
1A6A1CR1		SEMICONDUCTOR, DEVICE, DIODE: hot carrier 10 prv, .170 in. long body by .076 in. dia by .016 in. lead dia, mfr 28480, part no. 5082-2900	7-30 (8C)
1A6A1J1		Not Used	

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

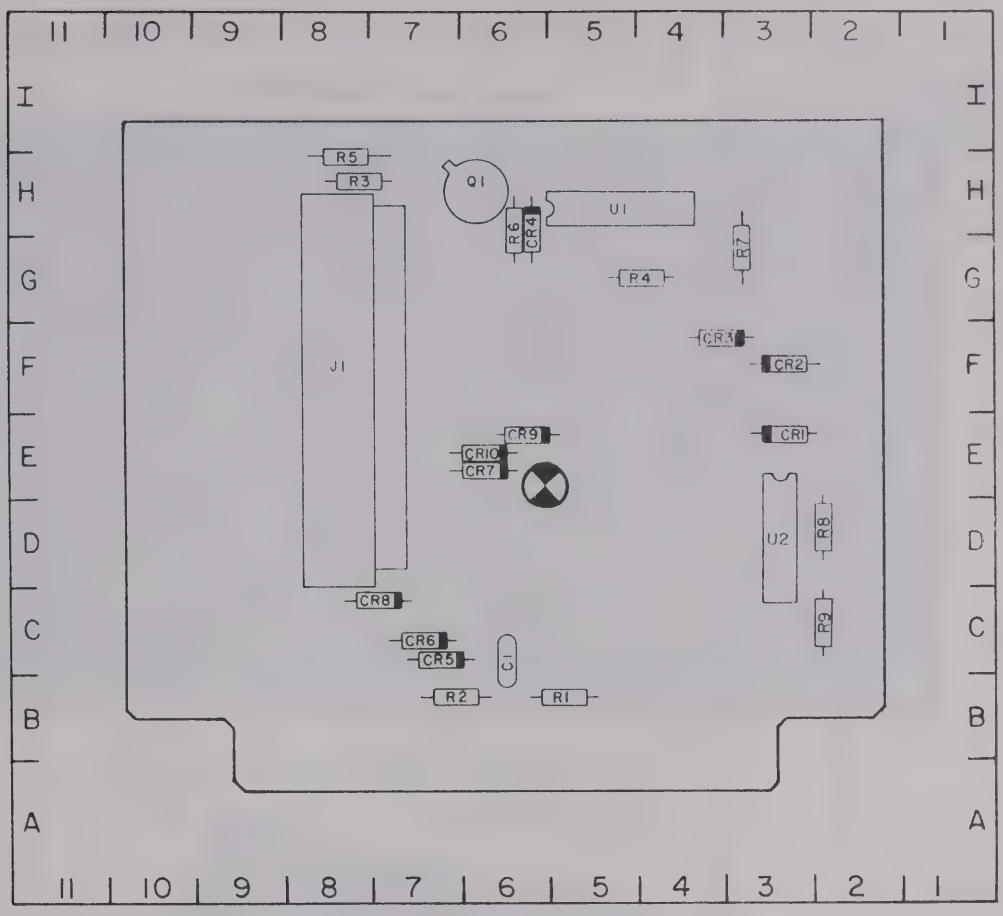
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A1J2		CONNECTOR, ELECTRICAL RECEPTACLE: gold nickel plated post, 16 positions, 1.00 in. long by .376 in. wide, mfr 00779, part no. 87567-4	7-30 (18F)
1A6A1J3, 1A6A1J4		CONNECTOR: same as 1A6A1J2	7-30 (18C, 18H)
1A6A1MP1 Thru 1A6A1MP4		JACK, ELECTRICAL: printed circuit thru hole, .110 in. long by .080 in. dia for .025 pin, captive spring insert, mfr 18310, part no 09-9017-1-06	7-30 (UNDER BT1)
1A6A1MP5		INSULATOR: see item 24	7-30 (UNDER Q1)
1A6A1MP6		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A6A1, mfr 14632, part no. 791575P1	7-30 (11F)
1A6A1Q1		TRANSISTOR: see item 63	7-30 (16F)
1A6A1R1, 1A6A1R2		RESISTOR: see item 38	7-30 (13G, 14G)
1A6A1R3		RESISTOR: same as 1A3A2R12	7-30 (6B)
1A6A1R4 Thru 1A6A1R8		RESISTOR: see item 38	7-30 (2C, 15I, 15F, 8F)
1A6A1R9		RESISTOR: same as 1A4A6R47	7-30 (17F)
1A6A1R10		RESISTOR: see item 38	7-30 (17F)
1A6A1R11		RESISTOR: see item 37	7-30 (17F)
1A6A1R12		RESISTOR: see item 36	7-30 (16G)
1A6A1R13		RESISTOR: see item 37	7-30 (16G)
1A6A1R14		RESISTOR: same as 1A4A6R3	7-30 (13H)
1A6A1U1		INTEGRATED CIRCUIT: hex schmitt trigger, 3.0 v to 15 v, monolithic complimentary mos (CMOS) constructed with N and P ch enhancement transistors, 14 pin dual-in-line, mfr 27014, part no. MM74C14N	7-30 (13H)
1A6A1U2 Thru 1A6A1U7		INTEGRATED CIRCUIT: see item 27	7-30 (7H, 5H, 7E, 5E, 7C, 4C)
1A6A1U8		INTEGRATED CIRCUIT: quad 2-input "AND" gate, double diode protected, 14 pin dual-in-line plastic, mfr 04713, part no. MC14081BCP	7-30 (9E)
1A6A1U9		INTEGRATED CIRCUIT: dual J-K flip flop, diode protected, 16 pin dual-in-line plastic, mfr 04713, part no. MC14027BCP	7-30 (11E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A1U10		INTEGRATED CIRCUIT: quad exclusive "OR" gate, double diode protected, 14 pin dual-in-line plastic, mfr 04713, part no. MC14070BCP	7-30 (9H)
1A6A1U11		INTEGRATED CIRCUIT: same as 1A6A1U8	7-30 (11H)
1A6A1U12		INTEGRATED CIRCUIT: 8 channel data selector, diode protected, 16 pin dual-in-line plastic, mfr 04713, part no. MC14512CP	7-30 (15E)
1A6A1U13 Thru 1A6A1U15		INTEGRATED CIRCUIT: same as 1A6A1U12	7-30 (15C, 13E 13C)
1A6A1U16		INTEGRATED CIRCUIT: dual binary up counter, diode protection, 16 pin dual-in-line plastic, mfr 04713, part no. MC14520BCP	7-30 (11C)
1A6A1U17		INTEGRATED CIRCUIT: hex buffer non-inverting, 16 pin dual-in-line plastic, mfr 04713, part no. MC14050BCP	7-30 (17D)
1A6A1U18		INTEGRATED CIRCUIT: same as 1A6A1U8	7-30 (8C)
1A6A2		CIRCUIT CARD ASSEMBLY: front panel interconnect, etched circuit board, translates information from the manually controlled front panel into control information for the receiver, 4.30 in. long by 3.850 in. wide by .375 in. thk, plugs into the motherboard, mfr 14632, part no. 791828-2	7-2 Sh 2 (70)
1A6A2C1		CAPACITOR: see item 10	7-31 (6B)
1A6A2CR1 Thru 1A6A2CR10		SEMICONDUCTOR: see item 62	7-31 (3E, 3F, 4F, 6H, 7C, 6E)
1A6A2J1		CONNECTOR, ELECTRICAL, RECEPTACLE: 40 pin right angle header assembly double row 0.10 ctrs MOD11, mfr 00779, part no. 1-87567-6	7-31 (8F)
1A6A2MP1		INSULATOR: same as 1A3A2MP2	7-31 (UNDER Q1)
1A6A2MP2		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A6A2, mfr 14632, part no. 791828P1	7-31 (6E)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A2Q1		TRANSISTOR: med speed sw sat pnp silicon, T0-5, mfr 80131, part no. 2N4037	7-31 (6H)
1A6A2R1		RESISTOR, FIXED, COMPOSITION: 620 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G621JS	7-31 (5B)
1A6A2R2		RESISTOR: see item 36	7-31 (7B)
1A6A2R3		RESISTOR: see item 50	7-31 (8H)
1A6A2R4		RESISTOR: see item 39	7-31 (4G)
1A6A2R5		RESISTOR, FIXED, COMPOSITION: 22 ohms, 5 pct, .5 w, 350 v rated, .390 in. long body by .140 in. dia by .025 in. lead dia, mfr 81349, part no. RCR20G220JS	7-31 (8H)
1A6A2R6 Thru 1A6A2R9		RESISTOR: see item 38	7-31 (6H, 3G, 2D, 2C)
1A6A2U1		INTEGRATED CIRCUIT: triple 2 channel multiplexer, diode protected, 16 pin dual-in-line plastic, mfr 04713 part no. MC14053BCP	7-31 (5H)
1A6A2U2		INTEGRATED CIRCUIT: same as 1A6A2U1	7-31 (3D)
1A7		MANUAL TUNING MODULE: .090 thk alum alloy, front panel function uses a manual tuning knob, manual tuning module controls direction and rate of change of the tuned frequency, 6.00 in. long by 3.50 in. wide by 1.00 in. thick, mfr 14632, part no. 791874-3	7-2 Sh 2 (75)
		(Attaching Hardware)	
		SCREW, MACHINE: pan head cross-recessed 6-32 x 1/2 cres, mfr 96906, part no. MS51957-30 (4)	
		WASHER, LOCK: no. 6 .144 id, .25 od, .031 in. thk cres, mfr 96906, part no. MS35338-136 (4)	
		WASHER, FLAT: no. 6 156 id, .312 od, .035 in. thk cres, mfr 96906, part no. MS15795-805 (4)	
1A7MP1		KNOB ASSEMBLY: spinner, 2.50 in. dia by .78 in. thick zinc casting, mfr 14632, part no. 280064-1	7-32 (1)



PARTS LOCATION INDEX
ASSEMBLY 1A6A2

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	6B	MP2	6E
CR1	3E	Q1	6H
CR2	3F	R1	5B
CR3	4F	R2	7B
CR4	6H	R3	8H
CR5	7C	R4	4G
CR6	7C	R5	8H
CR7	6E	R6	6H
CR8	7C	R7	3G
CR9	6E	R8	2D
CR10	6E	R9	2C
J1	8F	U1	5H
MP1	UNDER Q1	U2	3D

Figure 7-31. Front Panel Interconnect 791828-2 (1A6A2)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A7MP2 Thru 1A7MP6		BUTTON: black shell with green indicator, mfr 31918, part no. FA101-blk w/grn	7-32 (2)
1A7MP7		LENS, ACTUATOR: al alloy 5052-H32, .09 in. thk, 3.32 in. long by .78 in. deep, mfr 14632, part no. 24459-1	7-32 (3-6)
1A7U1		ENCODER ASSEMBLY: panel coder totempole outlet, power 5 vdc ±5 pct at 60 mA max, resolution 127 ppr, output 3 v pp min into 10 k ohm load, solder terminals, 1.50 in. dia by 1.08 in. deep, .87 in. long shaft by .25 in. dia, mfr 14632, part no. 34836-1	7-32 (7)
1A7A1		CIRCUIT CARD ASSEMBLY: tuning resolution switch, etched circuit board, switches select the desired tuning step (10 Hz, 100 Hz, 1 kHz and 10 kHz), 0.500 in. thk by 3.20 in. long by 1.55 in. wide plus 1.00 in. switch overhang, connected by solder terminals and ribbon cable connector, mfr 14632, part no. 791589-4	7-2 Sh 2 (73)
1A7A1MP1		CONNECTOR, PADDLE BOARD: 16 pin 0.10 post length, mfr 00779, part no. 88213-2	7-33 (7E)
1A7A1MP2		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A7	7-33 (6G)
1A7A1P1		CONNECTOR, ELECTRICAL, PLUG: kit 16 socket double row for flat cable (kit includes 88376-8 HSG, 88340-8 C/SR), mfr 00779, part no. 88475-3	7-33 (7E)
1A7A1S1		SWITCH, PUSHBUTTON: 5 station 2 pole single throw, 3.253 in. long by .838 in. high by .319 in. wide, mfr 14632, part no. 18488	7-33 (5G)
1A8		CIRCUIT CARD ASSEMBLY: frequency display, etched circuit board, frequency display accepts multiplexed information from manual tuning up/ down counter and displays it on front panel, 0.420 in. thk by 6.10 in. long by 2.25 in. wide, connected by a pigtail with plug in connector, mfr 14632, part no. 791578-2	7-2 Sh 2 (74)

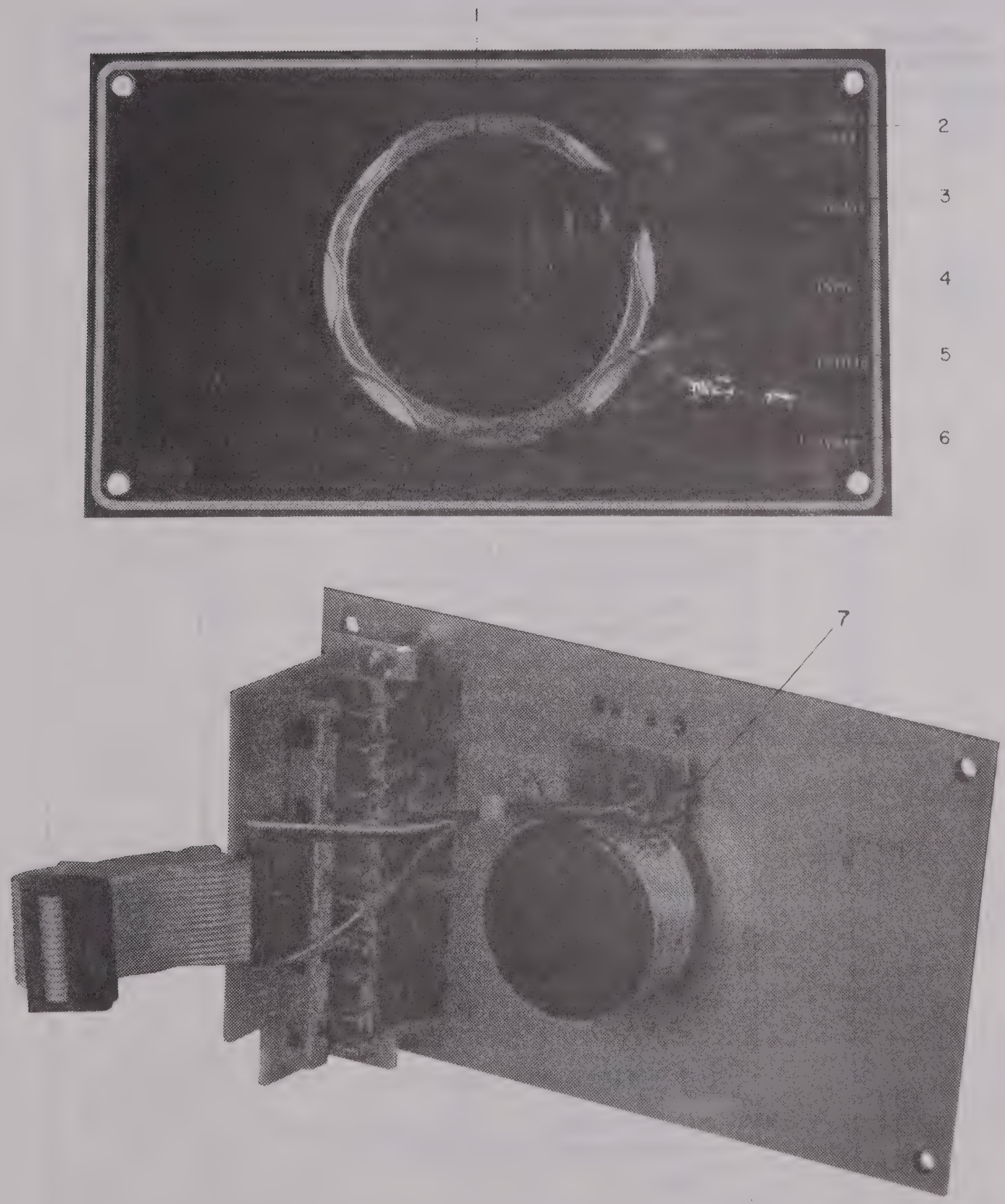
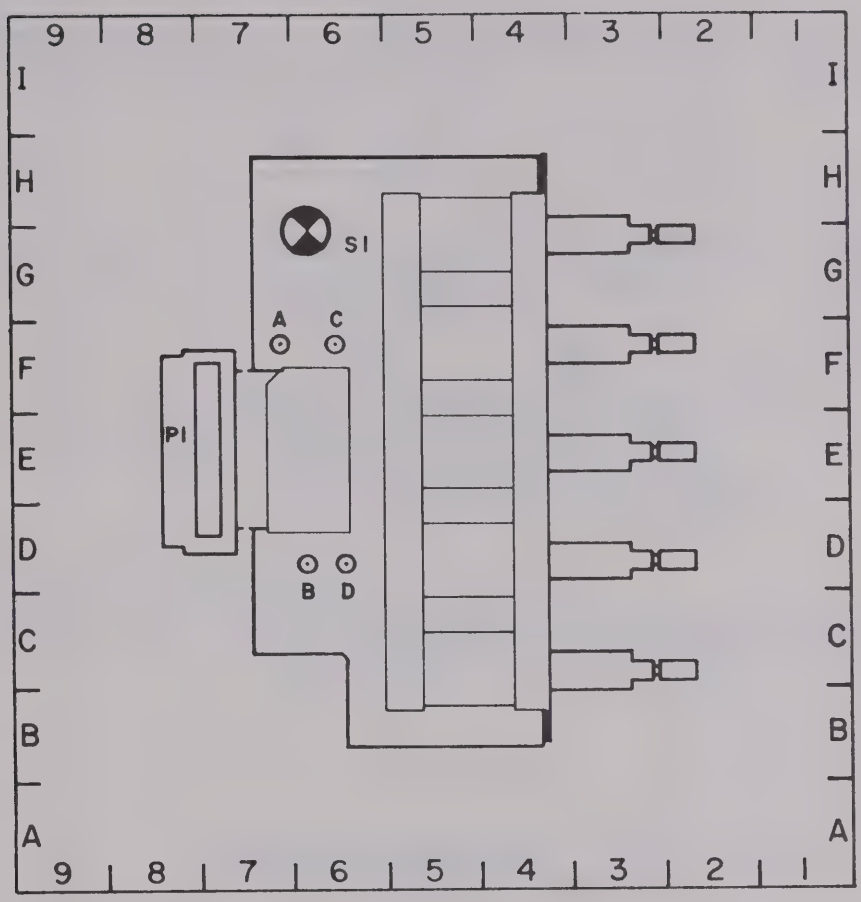


Figure 7-32. Manual Tuning Module 791874-3, Front and Rear View (1A7)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

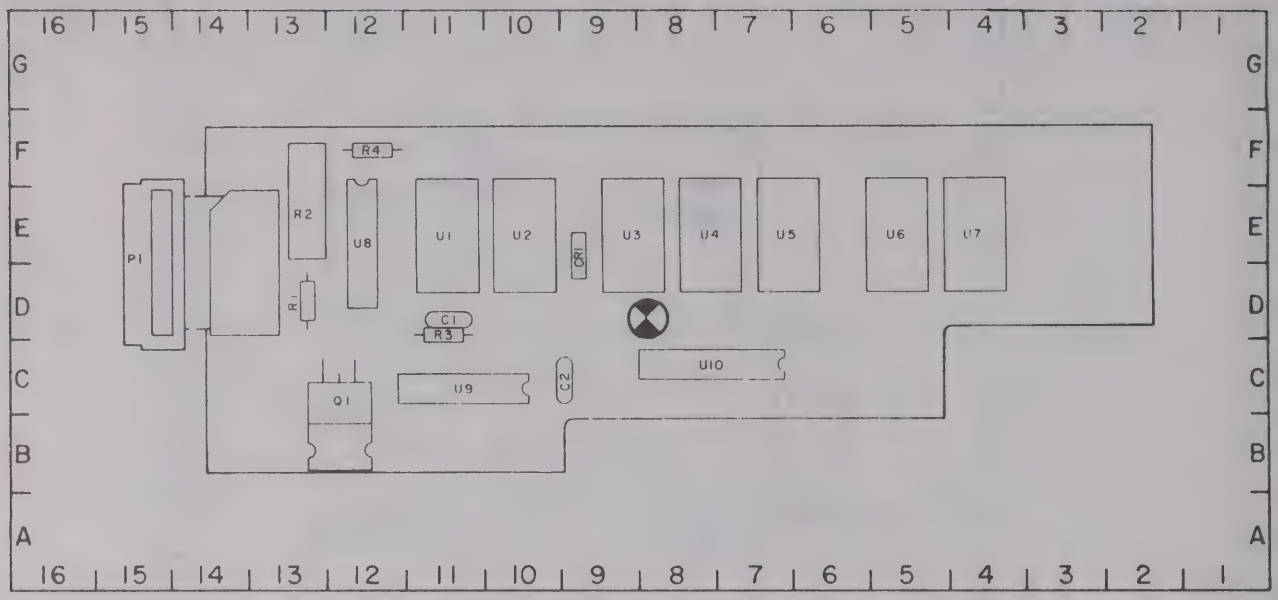
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A8C1, 1A8C2		CAPACITOR: see item 11	7-34 (11D, 9C)
1A8CR1		SEMICONDUCTOR DEVICE, DIODE: LED yellow defused subminiature 2.0 mcd type, mfr 28480, part no. 5082-4150	7-34 (9E)
1A8MP1		INSULATOR: same as 1A5MP2	7-34 (12B)
1A8MP2		CONNECTOR: same as 1A7A1MP1	7-34 (15E)
1A8MP3		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A8	7-34 (8D)
		(Attaching Hardware)	
		SCREW, MACHINE: pan head cross-recessed 4-40 x 7/16 cres, mfr 96906, part no. MS51957-16 (5), C(5), A(5)	
1A8P1		CONNECTOR: same as 1A7A1P1	7-34 (15E)
1A8Q1		TRANSISTOR: npn single-diffused mesa silicon power transistor, 30 w at 25° C case temp, 1 amp rated collector current, 3 lead, .550 in. long by .420 in. wide, .19 in. thick with mounting tab, mfr 01295, part no. TIP29	7-34 (12C)
1A8R1		RESISTOR: see item 42	7-34 (13D)
1A8R2		RESISTOR, VARIABLE: 100 ohms, 10 pct, 0.75 w, 0.75 in. long by .19 in. wide, .25 in. high, rectangular 20-turn cermet, mfr 73138, part no. 89PR100	7-34 (13E)
1A8R3		RESISTOR: same as 1A4A6R47	7-34 (11D)
1A8R4		RESISTOR: same as 1R3	7-34 (12F)
1A8U1		INTEGRATED CIRCUIT: LED numeric 7 segment 0.43 in. yellow com cath right hand dec, mfr 28480, part no. 5082-7663	7-34 (11E)
1A8U2 Thru 1A8U7		INTEGRATED CIRCUIT: same as 1A8U1	7-34 (10E, 9E, 8E, 7E, 5E, 4E)
1A8U8		INTEGRATED CIRCUIT: bcd to 7 segment LED driver 50 mA, 16 pin dual-in-line, mfr 27014, part no. DS8857N	7-34 (12E)



PARTS LOCATION INDEX
ASSEMBLY 1A7A1

REF DESIG	LOCATION
MP1	7E
MP2	6G
P1	7E
S1	5G

Figure 7-33. Tuning Resolution 791589-4 (1A7A1)



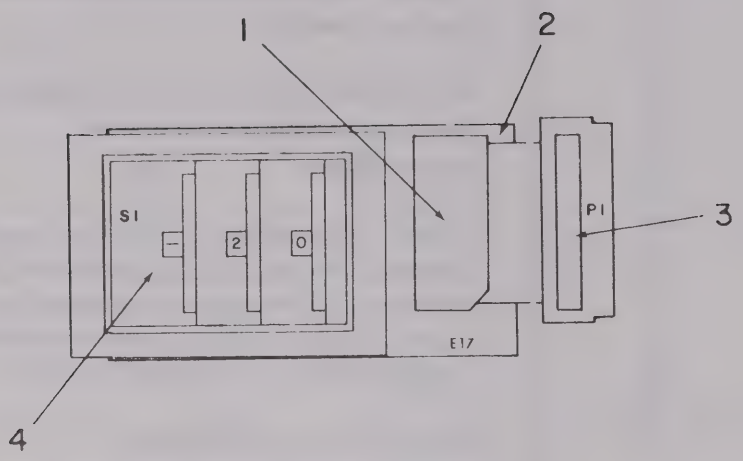
PARTS LOCATION INDEX
ASSEMBLY 1A8

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	11D	R4	12F
C2	9C	U1	11E
CR1	9E	U2	10E
MP1	12B	U3	9E
MP2	15E	U4	8E
MP3	8D	U5	7E
P1	15E	U6	5E
Q1	12C	U7	4E
R1	13D	U8	12E
R2	13E	U9	11C
R3	11D	U10	8C

Figure 7-34. Frequency Display 791578-2 (1A8)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A8U9		INTEGRATED CIRCUIT: cmos bcd to decimal decoder, 16 pin dual-in-line plastic, mfr 02735, part no. CD4028AE	7-34 (11C)
1A8U10		INTEGRATED CIRCUIT: mos-to-LED 8 digit driver, 18 pin dual-in-line plastic, mfr 27014, part no. DS8863N	7-34 (8C)
1A9		CIRCUIT CARD ASSEMBLY: bfo switch, epoxy resin glass base laminate w/1 oz. copper circuitry, three thumbwheel switches provide a bfo variation of ±1.25 in. wide by 1.50 in. thk connected by ribbon cable connector, mfr 14632, part no. 791827-2	7-2 Sh 2 (76)
1A9MP1		CONNECTOR: same as 1A7A1MP1	7-35 (1)
1A9MP2		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A9, mfr 14632, part no. 791827P1	7-35 (2)
		(Attaching Hardware)	
		SCREW, MACHINE: 82 deg flat head slotted 2-56 x 5/16 cres, mfr 96906, part no. MS35249-11 (4)	
		WASHER, FLAT: no. 2 .089 id .149 od .016 in. thk cres, mfr 80205, part no. NAS620C2 (4), B(4)	
		NUT PLAIN, HEX: 2-56 x 5/32 acrflt 1/16 in. thk cres, mfr 80205, part no. NAS671C2 (4)	
1A9P1		CONNECTOR: same as 1A7A1P1	7-35 (3)
1A9S1		SWITCH, THUMBWHEEL: 3 section panel mount sna pin, matte black body, white numbers 0 thru 9, mfr 09353, part no. 339910490-00226	7-35 (4)
1A10		FRONT PANEL CONTROL: consist of the upper and lower panel control boards joined by 40 pin ribbon connectors, controls the manual selection of detection mode, gain mode, meter mode, if. bandwidth, rf gain and headphone levels, mfr 14632, part no. 791684-4	7-2 Sh 2 (78)



REF DESIG	ITEM NO.
MP1	1
MP2	2
P1	3
S1	4

Figure 7-35. Bfo Switch 791827-2 (1A9)

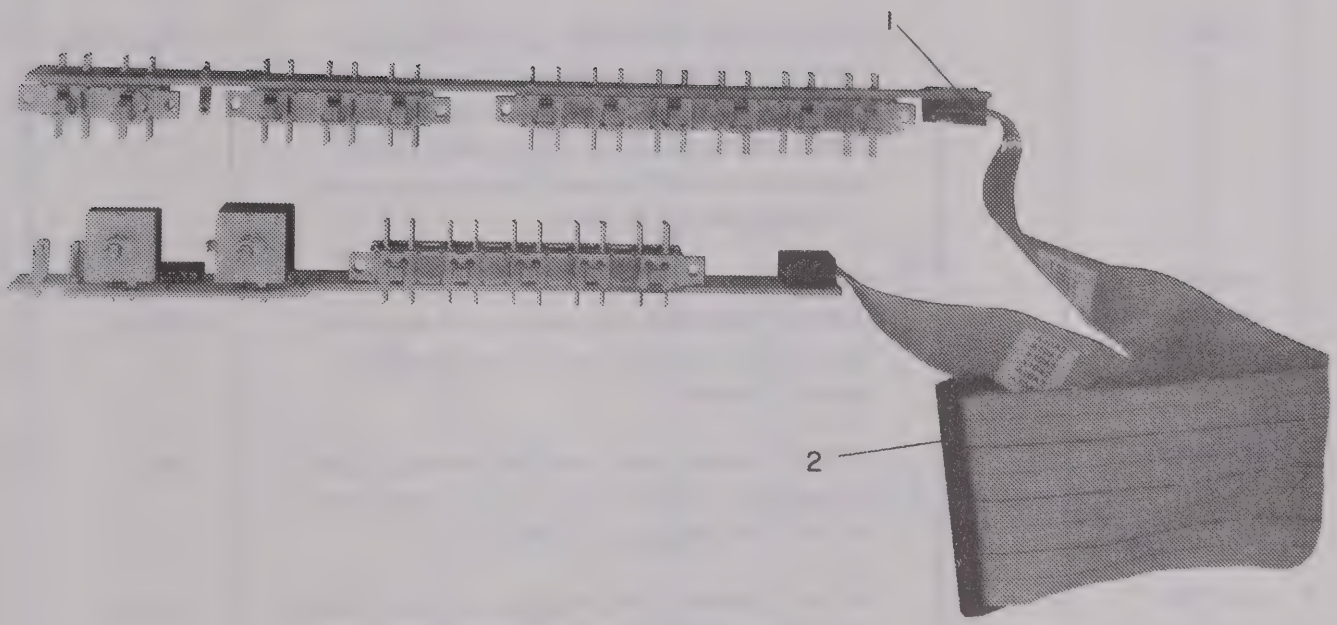
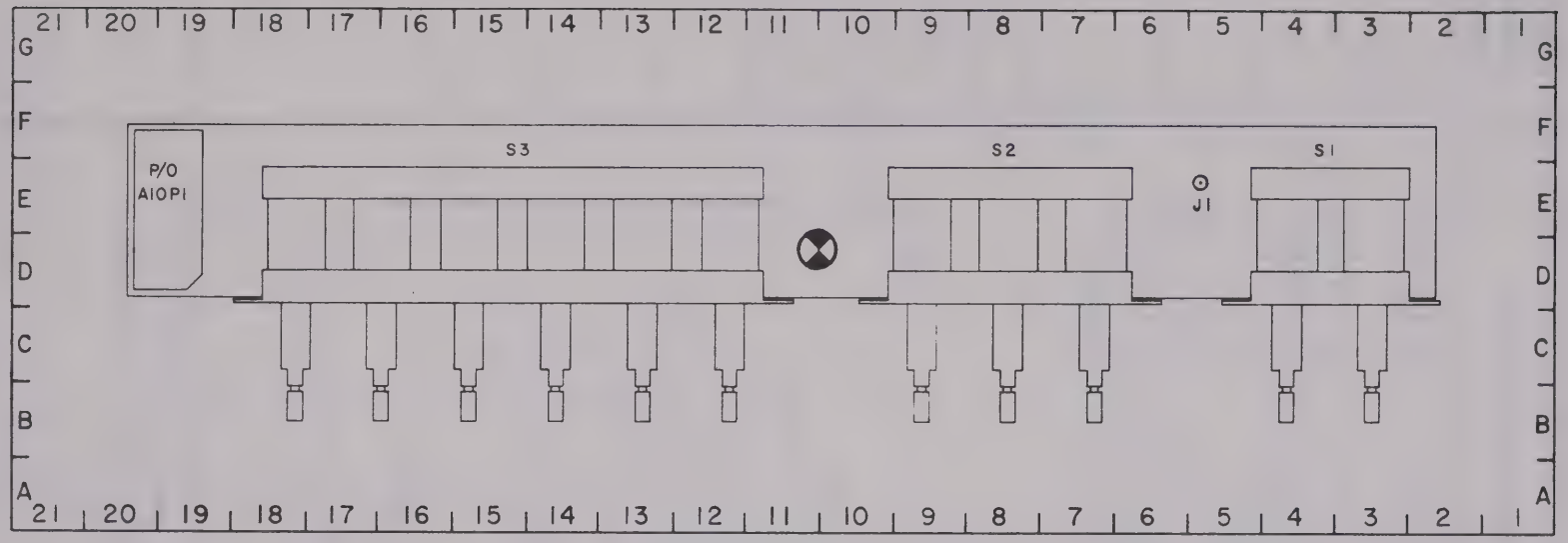


Figure 7-36. Front Panel Control 791684-4 (1A10)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A10MP1		CONNECTOR, PADDLE BOARD: 20 pin 0.10 pin length, mfr 00779, part no. 88213-3	7-36 (1)
1A10P1		CONNECTOR, ELECTRICAL PLUG: kit, 40 socket double row for flat cable (kit includes 88378-1 HSG and 88340-1 C/SR), mfr 00779, part no. 88476-7	7-36 (2)
1A10A1		CIRCUIT CARD ASSEMBLY: upper panel control, etched circuit board, allows selection of detection mode, gain mode and meter mode, 0.500 in. thk by 8.88 in. long by 1.15 in. wide plus 1.00 in. switch length connected by external ribbon cable connector, mfr 14643, part no. 791583-2	7-2 Sh 2 (77)
1A10A1J1		CONNECTOR: see item 21	7-37 (5E)
1A10A1MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A10A1, mfr 14632, part no. 791583P1	7-37 (11D)
1A10A1S1		SWITCH, PUSHBUTTON: 2 station 2 pole single throw, spring loaded, 1.482 in. long by .838 in. high by .319 in. wide, mfr 14632, part no. 18485	7-37 (4F)
1A10A1S2		SWITCH, PUSHBUTTON: 3 station 2 pole single throw, spring loaded, 2.072 in. long by .838 in. high by .319 in. wide, mfr 14632, part no. 18486	7-37 (8F)
1A10A1S3		SWITCH, PUSHBUTTON: 6 station 2 pole single throw, spring loaded, 3.843 in. long by .838 in. high by .319 in. wide, mfr 14632, part no. 18487	7-37 (15F)
1A10A2		CIRCUIT CARD ASSEMBLY: lower panel control, plastic sheet laminated metal clad. Allows selection of if. bandwidth and variation of rf gain and phone level potentiometers, 7.58 in. long by 1.78 in. wide by .650 in. thk connected by solder terminals and push on connector, mfr 14632, part no. 791826-3	7-3 (11)
1A10A2C1		CAPACITOR: see item 11	7-38 (7C)
1A10A2MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A10A2, mfr 14632, part no. 791826P1	7-38 (8C)



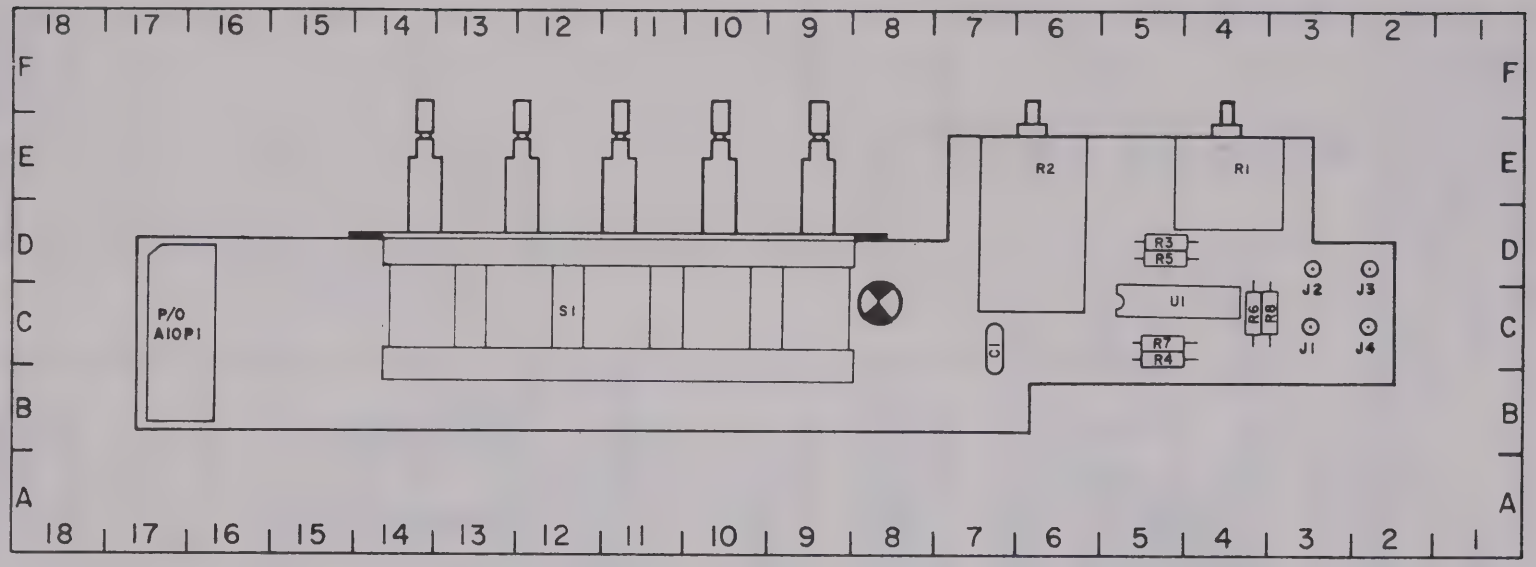
PARTS LOCATION INDEX
ASSEMBLY 1A10A1

REF DESIG	LOCATION
J1	5E
MP1	11D
S1	4F
S2	8F
S3	15F

Figure 7-37. Upper Panel Control 791583-2 (1A10A1)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

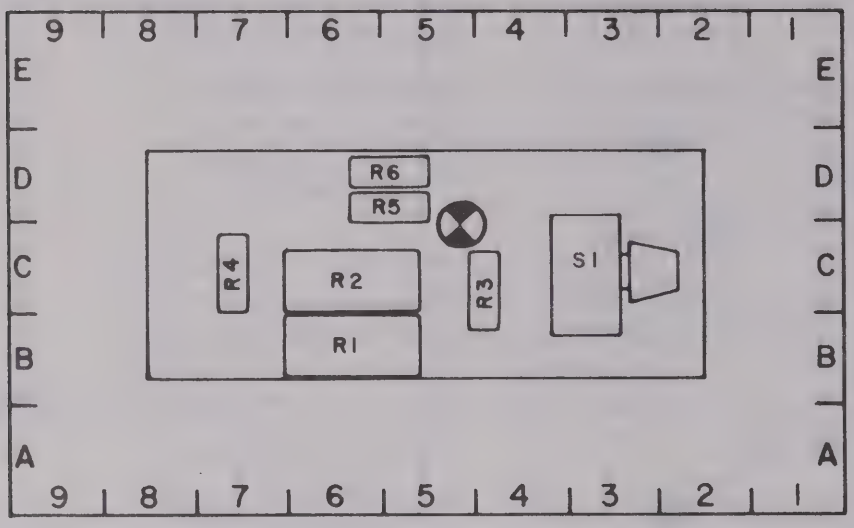
REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A10A2J1 Thru 1A10A2J4		CONNECTOR: see item 21	7-38 (3C, 3D, 2D, 2C)
1A10A2R1		RESISTOR, VARIABLE: 25 k ohms, 10 pct, 1 w linear, square term single hot molded, 3 locating lugs, plain bushing .375, .875 in. shaft, mfr 01121, part no. 70M3N056L253U	7-38 (4E)
1A10A2R2		RESISTOR, VARIABLE: 25k/25k ohms, 10 pct, 1 w log, dual hot molded, 3 locating lugs, plain bushing .375, .875 in. shaft, mfr 01121, part no. 70P3N056L253A	7-38 (6E)
1A10A2R3, 1A10A2R4		RESISTOR: see item 46	7-38 (5D, 5C)
1A10A2R5		RESISTOR: see item 39	7-38 (5D)
1A10A2R6		RESISTOR: see item 37	7-38 (4C)
1A10A2R7		RESISTOR: see item 39	7-38 (5C)
1A10A2R8		RESISTOR: see item 37	7-38 (3C)
1A10A2S1		SWITCH: same as 1A7A1S1	7-38 (12C)
1A10A2U1		INTEGRATED CIRCUIT: see item 28	7-38 (5C)
1A11		CIRCUIT CARD ASSEMBLY: switchable attenuator 30 dB, 16-ohm, switches a 30 dB attenuation network into the rear panel line audio output, 0.400 in. thick by 3.00 in. long by 1.25 in. wide, connected by a cable connector, mfr 14632, part no. 796094-1	7-2b (58)
1A11MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A11, mfr 14632, part no. 796094P1	7-39 (5C)
		(Attaching Hardware)	
		SPACER: .16 in. long by .187 od by .117 id 6061-T6 alum allow tube, mfr 14632, part no. 20753-8(4), F(4), C(4), A(4)	
1A11R1		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 pct, 2 w, 500 v rated, .687 in. long body by .312 in. dia by .045 in. lead dia, mfr 81349, part no. RCR42G330JS	7-39 (6B)



PARTS LOCATION INDEX
ASSEMBLY 1A10A2

REF DESIG	LOCATION	REF DESIG	LOCATION
C1	7C	R3	5D
MP1	8C	R4	5C
J1	3C	R5	5D
J2	3D	R6	4C
J3	2D	R7	5C
J4	2C	R8	3C
R1	4E	S1	12C
R2	6E	U1	5C

Figure 7-38. Lower Panel Control 791826-3 (1A10A2)



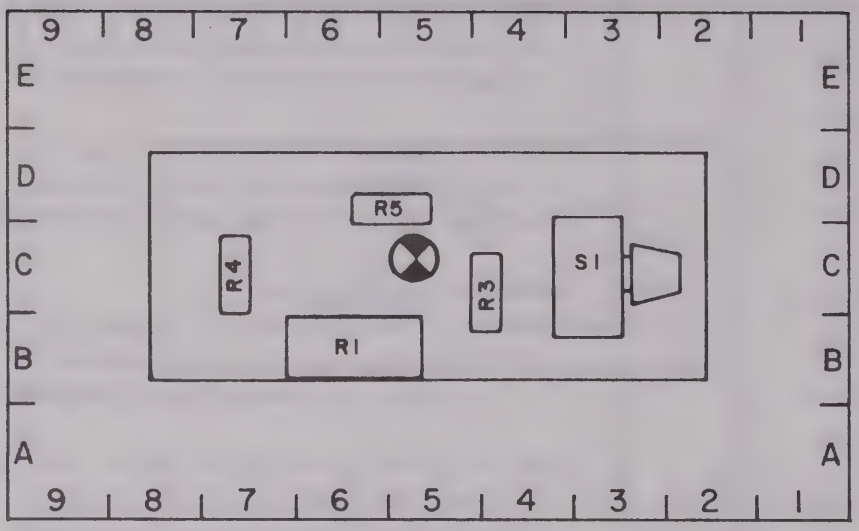
PARTS LOCATION INDEX
ASSEMBLY 1A11

REF DESIG	LOCATION	REF DESIG	LOCATION
MP1	5C	R4	7C
R1	6B	R5	5D
R2	6C	R6	5D
R3	4C	S1	3C

Figure 7-39. Switchable Audio Attenuator 30 dB, 16-ohm 796094-1 (1A11)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A11R2		RESISTOR, FIXED, COMPOSITION: 36 ohms, 5 pct, 2 w, 500 v rated, .687 in. long body by .312 in. dia by .045 in. lead dia, mfr 81349, part no. RCR42G360JS	7-39 (6C)
1A11R3		RESISTOR, FIXED, COMPOSITION: 120 ohms, 5 pct, .5 w, 350 v rated, .390 in. long body by .140 in. dia by .031 in. lead dia, mfr 81349, part no. RCR20G121JS	7-39 (4C)
1A11R4		RESISTOR: same as 1A11R3	7-39 (7C)
1A11R5		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 pct, .5 w, 350 v rated, .390 in. long body by .140 in. dia by .031 in. lead dia, mfr 81349, part no. RCR20G330JS	7-39 (5D)
1A11R6		RESISTOR, FIXED, COMPOSITION: 36 ohms, 5 pct, .5 w, 350 v rated, .390 in. long body by .140 in. dia by .031 in. lead dia, mfr 81349, part no. RCR20G360JS	7-39 (5D)
1A11S1		SWITCH, SLIDE: 4 pole double throw pc mount, silver plated right angle, .270 in. long lever, .632 in. long body by .396 in. high, mfr 95146, part no. MSS-4200R	7-39 (3C)
1A12		CIRCUIT CARD ASSEMBLY: switchable audio attenuator - epoxy resin glass base laminate w/1 oz copper circuitry, switches a 20 dB attenuation network into the rear panel ISB audio, 0.400 in. thick by 3.00 in. long by 1.25 in. wide, connected by cable connector, mfr 14632, part no. 796094-2	7-2 Sh 2 (60)
1A12MP1		PRINTED WIRING BOARD: basic etched circuit less the assembled parts for item 1A12, mfr 14632, part no. 796094P1	7-40 (5C)
		(Attaching Hardware)	
		SPACER: .16 in. long by .187 od by .117 id 6061-T6 alum alloy tube, mfr 14632, part no. 20753-8 (4), F(4), C(4), A(4)	
1A12R1		RESISTOR: same as 1A5A2R47	7-40 (6B)
1A12R2		Not Used	
1A12R3, 1A12R4		RESISTOR: see item 43	7-40 (4C, 7C)



PARTS LOCATION INDEX
ASSEMBLY 1A12

REF DESIG	LOCATION	REF DESIG	LOCATION
MP1	5C	R4	7C
R1	6B	R5	5D
R3	4C	S1	3C

Figure 7-40. Switchable Audio Attenuator 20 dB, 600-ohm 796094-2 (1A12)

TABLE 7-2. Radio Receiving Set AN/URR-74(V)2, Parts List-Continued

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A12R5		RESISTOR: same as 1A5A2R47	7-40 (5D)
1A12S1		SWITCH: same as 1A11S1	7-40 (3C)
1A13		POWER INPUT FILTER ASSEMBLY: copper flashed nickel plated brass chassis, houses the ac line filter in a rfi frame and provides a mounting hole for special mil-connector, 3.12 in. long by 1.937 in. wide by 2.50 in. high, connected by screws, mfr 14632, part no. 796098-1	7-2 Sh 2 (55)
1A13FL1		FILTER, POWER LINE: 115/250 vac, 50-400 Hz, 15 dB/0.15 MHz, 30 dB/0.5 MHz, 55 dB/10 MHz, 2 amp, 1.75 in. wide by 2.00 in. long by .875 in. high, mounting tabs .188 in. dia holes, 5 leads no. 2 awg, mfr 05245, part no. 2K3	7-41 (1)
1A13J1		CONNECTOR, ELECTRICAL, RECEPTACLE: 3 pin cylindrical box mount, mfr 96906, part no. MS3102E-16S-5P	7-41 (2)

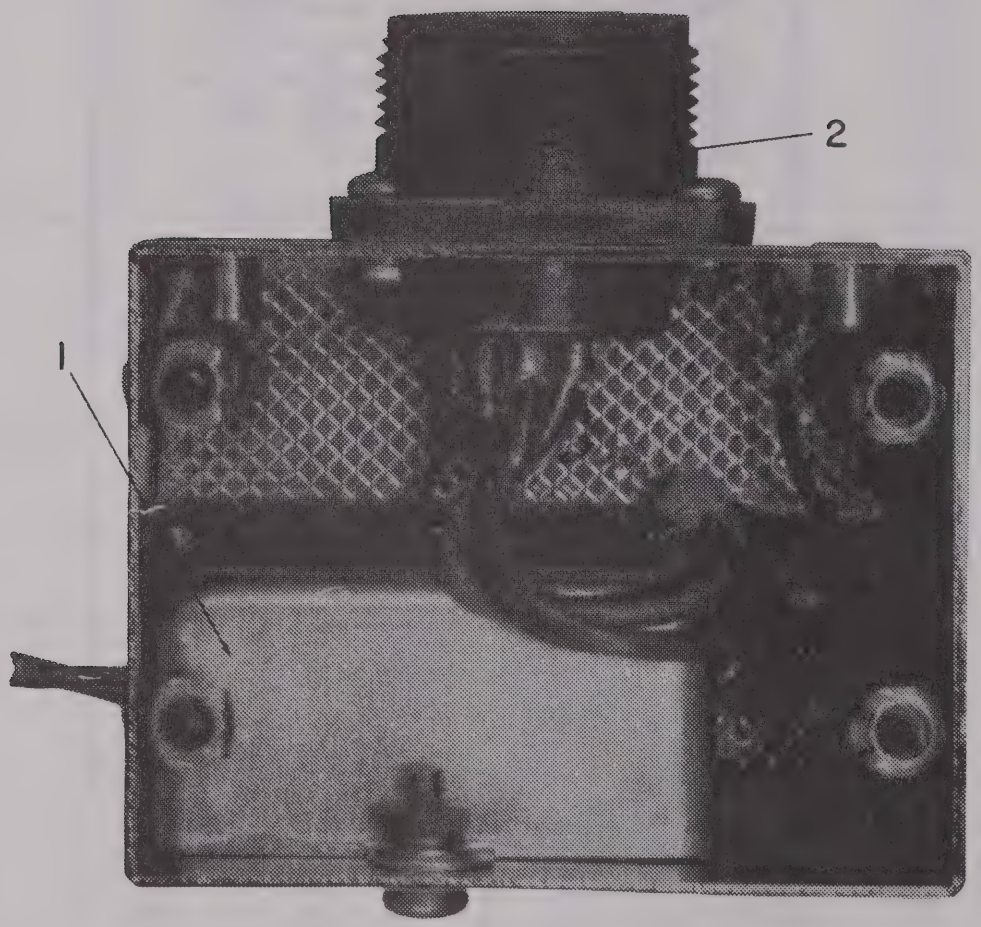


Figure 7-41. Power Input Filter Assembly 796098-1 (1A13)

Table 7-3. List of Common Item Descriptions

ITEM NUMBER	DESCRIPTION
1	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 1000 pF gmv, 500 v, disc with no. 22 awg tinned leads, mfr 91418, part no. B-GP1000PFP
2	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 470 pF, 20 pct, 1000 v, mfr 91418, part no. B470PFM
3	CAPACITOR, FIXED, ELECTROLYTIC: 15 µF, 10 pct, 20 v, mfr 81349, part no. CS13BE156K
4	CAPACITOR, CERAMIC, FEEDTHRU: 0.01 µF, 20 pct, 600 v w/lug terminals, mfr 96733, part no. F1A6103K
5	CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 20 pct, 10 v, solid tantalum, mfr 56289, part no. 196D226X0010JE3
6	CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 20 pct, 15 v, solid tantalum, mfr 56289, part no. 196D226X0015KE3
7	CAPACITOR, FIXED ELECTROLYTIC: 47 µF, 20 pct, 20 v, .350 x .650, mfr 56289, part no. 196D476X0020PE4
8	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 47 pF, 5 pct, 500 v npo, tubular, mfr 72982, part no. 308-000C0G0-470J
9	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 200 pF, P50 pct M0, N5600 ±1000 P/M/°C, solder in disc, .230 in. dia by .06 in. thick with tinned electrodes, mfr 91984, part no. 32-257578-40
10	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.47 µF ±20 pct, 50 vdc working, mfr 14632, part no. 34452-1
11	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: .01 µF, 20 pct, 500 v, mfr 14632, part no. 34453-1
12	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.1 µF ±20 pct, 50 vdc working, mfr 14632, part no. 34475-1
13	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, gmv, 500 v, mfr 33095, part no. 54-794-009-102W
14	COIL, RADIO FREQUENCY: fixed molded, 10 µH, 10 pct, phenolic core, .155 in. dia by .375 in. long, mfr 99800, part no. 1537-36
15	COIL, RADIO FREQUENCY: 6.8 mH, 10 pct, pc mount, .375 in. dia by .375 in. wide by .025 in. dia tinned leads, mfr 71279, part no. 553-3635-47
16	CONNECTOR, PLUG, ELECTRICAL: subminiature gold plated, used with RG-188/U, RG-316/U, 43/64 in. long by 7/32 in. wide, mfr 80058, part no. UG-1465/U
17	CONNECTOR, PLUG, ELECTRICAL: subminiature, right angle, used with RG-188/U, RG-316, gold plated, 50 ohms, mfr 80058, part no. UG1466/U

Table 7-3. List of Common Item Descriptions-Continued

ITEM NUMBER	DESCRIPTION
18	CONNECTOR, PLUG, ELECTRICAL: subminiature screw on, 50-ohms, gold plated, used with RG-188/U, mfr 80058, part no. UG-1468/U
19	CONNECTOR, PLUG, ELECTRICAL: faston receptacle for no. 18-22 awg wire, mates with .032 in. x .250 in. tab insulated, mfr 00779, part no. 2-350804-2
20	CONNECTOR, PLUG, ELECTRICAL: faston receptacle for no. 20-22 awg wire, pre-tinned brass, .15 in. wide by .635 in. long by .025 in. thick, mfr 00779, part no. 42236-1
21	CONNECTOR, PLUG, ELECTRICAL: faston tab, 0.110 in. wide x 0.02 in. thick, pc mount, style B, mfr 00779, part no. 62073-1
22	CONNECTOR, PLUG, ELECTRICAL: 3 position, single row, 0.10 centers for crimp contacts, mfr 00779, part no. 87499-5
23	FERRITE BEAD: vhf, 0.047 id 0.138 od, 0.118 long, medium permeability ferrite material, used for shielding and parasitic suppression, mfr 02114, part no. 56-590-65-4A
24	INSULATOR, DISK: 4 lead, .13 in. thick for TO-18 case, mfr 13103, part no. 7717-44DAP
25	INSULATOR, DISK: 4 lead, .06 in. thick, for TO-18 case, mfr 13103, part no. 7717-46DAP
26	INSULATOR, DISK: 4 lead, .08 in. thick for TO-18 case, mfr 13103, part no. 7717-89DAP
27	INTEGRATED CIRCUIT: bcd up/down counter, diode protected, 5.0 MHz count rate, 16 pin dual-in-line plastic, mfr 04713, part no. MC14510BCP
28	INTEGRATED CIRCUIT: quad op amp, internally compensated, plastic dip, silicon monolithic, 14 pin, mfr 04713, part no. MC3403P
29	INTEGRATED CIRCUIT: phase frequency detector, dip, plastic 14 pin, mfr 04713, part no. MC4044P
30	INTEGRATED CIRCUIT: synchronous up/down counter with down/up mode control, counts 8-4-2-1 bcd, count enable control input, ripple clock output, asynchronously presettable w/load control, parallel outputs, 16 pin dual-in-line, mfr 01295, part no. SN74LS190N
31	INTEGRATED CIRCUIT: ttl/latch flip flop and counter asynchronous, 14 pin dual-in-line, mfr 01295, part no. SN74LS196N
32	RESISTOR, FIXED, COMPOSITION: 100 ohms, 5 pct .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G101JS
33	RESISTOR, FIXED, COMPOSITION: 1.0 k ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G102JS

Table 7-3. List of Common Item Descriptions-Continued

ITEM NUMBER	DESCRIPTION
34	RESISTOR, FIXED, COMPOSITION: 47 ohms, 5 pct, .125 w, 150 v rated, .145 in. long body by .062 in. dia by .02 in. lead dia, mfr 81349, part no. RCR05G470JS
35	RESISTOR, FIXED, COMPOSITION: 10 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G100JS
36	RESISTOR, FIXED, COMPOSITION: 100 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G101JS
37	RESISTOR, FIXED, COMPOSITION: 1.0 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G102JS
38	RESISTOR, FIXED, COMP^SITION: 10 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia, by .02 in. lead dia, mfr 81349, part no. RCR07G103JS
39	RESISTOR, FIXED, COMPOSITION: 100 k ohms, 5 pct, .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G104JS
40	RESISTOR, FIXED, COMPOSITION: 1.2 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G122JS
41	RESISTOR, FIXED, COMPOSITION: 12 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G123JS
42	RESISTOR, FIXED, COMPOSITION: 150 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349 part no RCR07G151JS
43	RESISTOR, FIXED, COMPOSITION: 1.5 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia, by .02 in. lead dia, mfr 81349, part no. RCR07G152JS
44	RESISTOR, FIXED, COMPOSITION: 15 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G153JS
45	RESISTOR, FIXED, COMPOSITION: 22 ohm, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G220JS
46	RESISTOR, FIXED, COMPOSITION: 220 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G221JS
47	RESISTOR, FIXED, COMPOSITION: 2.2 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G222JS

Table 7-3. List of Common Item Descriptions-Continued

ITEM NUMBER	DESCRIPTION
48	RESISTOR, FIXED, COMPOSITION: 22 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G223JS
49	RESISTOR, FIXED, COMPOSITION: 270 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G271JS
50	RESISTOR, FIXED, COMPOSITION: 2.7 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G272JS
51	RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 pct, .25 w, 250 v rated, .25 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G330JS
52	RESISTOR, FIXED, COMPOSITION: 3.9 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G392JS
53	RESISTOR, FIXED, COMPOSITION: 39 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G393JS
54	RESISTOR, FIXED, COMPOSITION: 47 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G470JS
55	RESISTOR, FIXED, COMPOSITION: 470 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G471JS
56	RESISTOR, FIXED, COMPOSITION: 4.7 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G472JS
57	RESISTOR, FIXED, COMPOSITION: 47 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G473JS
58	RESISTOR, FIXED, COMPOSITION: 560 ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G561JS
59	RESISTOR, FIXED, COMPOSITION: 6.8 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G682JS
60	RESISTOR, FIXED, COMPOSITION: 68 k ohms, 5 pct, .25 w, 250 v rated, .250 in. long body by .09 in. dia by .02 in. lead dia, mfr 81349, part no. RCR07G683JS
61	SEMICONDUCTOR DEVICE, DIODE: hi cond, high speed switch, 75 prv, silicon, mfr 80131, part no. 1N4449
62	SEMICONDUCTOR DEVICE DIODE: high speed switch, 15 piv, .300 in. long body by .107 in. dia by .022 in. lead dia, mfr 80131, part no. 1N995

Table 7-3. List of Common Item Descriptions-Continued

ITEM NUMBER	DESCRIPTION
63	TRANSISTOR: medium speed switch, sw sat and ampl, npn, silicon, TO-18, mfr 80131, part no. 2N2222A
64	TRANSISTOR: rf-if amplifier, npn, silicon, TO-72, mfr 80131, part no. 2N2857
65	TRANSISTOR: high speed switch, sat, npn, silicon, TO-18, mfr 81350, part no. 2N2907/JAN
66	TRANSISTOR: high speed switching sat, npn, silicon, TO-92, mfr 80131, part no. 2N3904
67	TRANSISTOR: silicon dual insulated gate, field effect N channel, depletion type with integrated gate protection circuits, 4 pin, hermetically sealed in metal TO-72, mfr 14632, part no. 841001-1 (3N187 RCA)

Table 7-4. List of Attaching Hardware

LETTER CODE	NAME AND DESCRIPTION
A	WASHER, FLAT: MS15795-803, no. 4, .125 in. id, .250 in. od, .022 in. thick cres, mfr 96906
B	WASHER, LOCK: MS35338-134, no. 2, .091 in. id, .172 in. od, .020 in. thick cres, mfr 96906
C	WASHER, LOCK: MS35338-135, no. 4, .118 in. id, .209 in. od, .025 in. thick cres, mfr 96906
D	SCREW, MACHINE: pan head cross-recessed, MS51957-13, 4-40 x 1/4 cres, mfr 96906
E	NUT, PLAIN HEX: NAS671C4, 4-40 x 3/16 across flat x 1/16 thick cres, mfr 80205
F	SCREW, MACHINE: pan head cross-recessed, MS51957-15, 4-40 x 3/8 cres, mfr 96906
G	SCREW, MACHINE: pan head cross-recessed, MS51957-14, 4-40 x 5/16 cres, mfr 96906

Table 7-5. List of Manufacturers

FSCM CODE	MANUFACTURER
00779	Amp Incorporated Post Office Box 3608 Harrisburg, PA 17105
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204
01139	General Electric Company Silicone Products Business Department Waterford, NY 12188
01295	Texas Instruments, Incorporated Semiconductor-Components Division 15300 North Central Expressway Dallas, TX 75231
02114	Ferroxcube Corporation, Incorporated Post Office Box 359 Mt. Marion Road Saugerties, NY 12477
02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
04013	Taurus Corporation 1 Academy Hill Lambertville, NJ 08530
04713	Motorola Incorporated Semiconductor Products Division 5005 East McDowell Road Phoenix, AZ 85008
05245	Corcom Incorporated 2635 N. Kildare Avenue Chicago, IL 60639
06540	Mitre Corporation Amatom Electronic Hardware Division 446 Blake Street New Haven, CT 06515
06978	Aladdin Electronics Division of Aladdin Industries 703 Murfreesboro Road Nashville, TN 37210
07263	Fairchild Camera & Instrument Corporation Semiconductor Division 464 Ellis Street Mountain View, VA 94040
07388	Toretel Incorporated 13402 South 71 Highway Grandview, MO 64030
08524	Deutsch Fastener Corporation Divison of Deutsch Corporation Post Office Box 92925 Los Angeles, CA 90045
09353	C & K Components, Incorporated 103 Morse Street Watertown, MA 02172
12498	Teledyne Crystalonics 147 Sherman Street Cambridge, MA 02140
13103	Thermalloy Company 2021 West Valley View Lane Dallas, TX 75234
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878

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FSCM CODE	MANUFACTURER
14655	Cornell-Dubilier Electronics Division of Federal Pacific Electric Company 150 Avenue L Newark, NJ 07101
15442	Mini-Circuits Laboratory Division of Scientific Components Corporation 2913 Quentin Road Brooklyn, NY 11229
15818	Teledyne Semiconductor 1300 Terra Bella Avenue Mountain View, CA 94040
16428	Belden Corporation Post Office Box 1101 Richmond, IN 47374
17856	Siliconix, Incorporated 2201 Laurelwood Road Santa Clara, CA 95050
18310	Concord Electronics Corporation 37 GT Jones Street New York, NY 10012
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
18714	RCA Corporation Solid State Division Fostoria Road Findlay, OH 45840
19080	Robinson Electronics Incorporated 3580 Sacramento Drive San Luis Obispo, CA 93401
19209	General Electric Company Battery Business Department Post Office Box 114 Gainsville, FL 32602
19505	Applied Engineering Products Company Division of Samarious, Incorporated 300 Seymour Avenue Derby, CT 06418
21604	The Buckeye Stamping Company 555 Marion Road Columbus, OH 43207
25088	Siemens America, Incorporated 186 Wood Avenue South Iselin, NJ 08830
26342	Fiberglass of Ohio Incorporated Dayton, Ohio
27014	National Semi-Conductor Corporation 2950 San Ysidro Way Santa Clara, CA 95051
27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
28480	Hewlett-Packard Company Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
31918	IEE/Schadow Incorporated 8081 Wallace Road Eden Prairie, MN 55343
33095	Spectrum Control, Incorporated 152 East Main Street Fairview, PA 16415
46384	Penn Engineering and Manufacturing Company Post Office Box 311 Doylestown, PA 18901

Table 7-5. List of Manufacturers-Continued

FSCM CODE	MANUFACTURER
52673	KSW Electronics Corporation South Bedford Street Burlington, Maine 01803
52748	Alpha Components, Incorporated 5223 East Simpson Ferry Road Mechanicsburg, PA 17055
56289	Sprague Electric Company Marshall Street North Adams, MA 01247
71279	Cambridge Thermionic Corporation 445 Concord Avenue Cambridge, MA 02138
71286	Rexnord Incorporation Specialty Fastener Division 22 Spring Valley Drive Post Office Box 98 Paramus, NJ 07652
71400	Bussman Manufacturing Division of McGraw-Edison Company 2536 W. University Street St. Louis, MO 63107
71785	TRW Electronic Components Cinch Connector Operations 1501 Morse Avenue Elk Grove Village, IL 60007
72136	Electro Motive Manufacturing Company, Incorporated South Park and John Streets Willimantic, CT 06226
72928	Gulton Industries Incorporated Gudeman Division Chicago, IL
72982	Erie Technological Products, Incorporated 644 West 12th Street Erie, PA 16512
73138	Beckman Instruments, Incorporated Helipot Division 2500 Harbor Boulevard Fullerton, CA 92634
74306	Piezo Crystal Company 100 K Street Carlisle, PA 17013
74868	Bunker Ramo Corporation The Amphenol RF Division 33 East Franklin Street Danbury, CT 06810
75042	TRW Electronic Components IRC Fixed Resistors 401 North Broad Street Philadelphia, PA 19108
75915	Littelfuse, Incorporated 800 East Northwest Highway Des Plaines, IL 60016
77820	Bendix Corporation, The Electrical Components Division Sherman Avenue Sidney, NY 13838
80058	Joint Electronic Type Designation System
80103	Lambda Electronics Corporation Div. of Veeco Instruments, Inc. 515 Broad Hollow Road Melville, NY 11746

Table 7-5. List of Manufacturers-Continued

FSCM CODE	MANUFACTURER
80131	Electronic Industries Association 2001 I Street, NW Washington, D.C. 20006
80205	Military Standard
81349	Military Specifications
81350	Joint Army-Navy Specifications
82227	North American Phillips Controls Corporation Cheshire Industrial Park Post Office Box 768 Cheshire, CT 06410
82389	Switchcraft, Incorporated 5555 North Elston Avenue Chicago, IL 60630
84411	TRW Electric Components TRW Capacitors 112 West First Street Ogallala, NE 69153
88245	Litton Industries USECO Division 13536 Saticoy Street Van Nuys, CA 91409
91293	Johanson Manufacturing Company Post Office Box 329 Boonton, NJ 07005
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, IL 60646
91984	Maida Development Company 214 Academy Street Hampton, VA 23369
92825	Whitso Incorporated 9330 Bryon Street Schiller Park, IL 60176
93332	Sylvania Electric Products, Incorporated Semiconductor Products Division 100 Sylvan Road Woburn, MA 01801
93958	Republic Electronics Corporation 176 East 7th Street Paterson, NJ 07524
95121	Quality Components, Incorporated Post Office Box 113 St. Marys, PA 15857
95146	ALCO Electronic Products Incorporated 1551 Osgood Street North Andover, Maine 01845
95987	Weckesser Company Incorporated 4444 West Irving Park Road Chicago, IL 60641
96733	San Fernando Electric Manufacturing Company 1501 First Street San Fernando, CA 91341
96906	Military Standard
98291	Sealectro Corporation 225 Hoyt Street Mamaroneck, NY 10544
98978	International Electronic Research Corporation 135 West Magnolia Blvd. Burbank, CA 91502
99800	American Precision Industries Delevan Electronics Division 270 Quaker Road East Aurora, NY 14052

Table 7-5. List of Manufacturers-Continued

FSCM CODE	MANUFACTURER
99848	Wilco Corporation 4030 West 10th Street Post Office Box 22248 Indianapolis, IN 46222

CHAPTER 8

INSTALLATION

8-1. INTRODUCTION. This chapter describes the procedures necessary to ensure proper installation of the receiver, as well as unpacking/repacking information, installation inspection requirements, and initial turn-on and test procedures.

8-2. SITE INFORMATION. The receiver is designed for installation in a 19 inch rack in accordance with MIL-STD-189, but can be installed in any standard electronic equipment rack that provides the necessary cable connections and ventilation requirements. Figure 8-1 gives the critical dimensions of the unit and Figure 8-2 identifies all rear panel connectors.

a. Temperature and Humidity. The receiver is designed for operational temperatures between 0°C and 50°C (32°F to 122°F) with maximum humidity of 95% (no condensation).

b. Ventilation. Receiver installation should provide free flowing air circulation around and through the unit. Multiple stacking, in particular, close adjacent stacking of electronic equipment in a standard console, can increase the operating temperature of all equipment contained in the console. Forced ventilation may be necessary to maintain proper air circulation and to assure proper operational temperature. Refer to paragraph 8-2c(3).

c. Electromagnetic and Electrical Interference. Electromagnetic and electrical interference will be minimized by the following:

(1) Proper grounding of the receiver main chassis GND connector located on the rear panel.

(2) Adequate shielding on all coaxial input/output cables.

(3) Utilization of properly grounded and shielded blower motors when forced air ventilation is required.

8-3. REFERENCE PUBLICATIONS. Refer to MIL-STD-1310A (Navy) for Shipboard Bonding and Grounding Methods for Electromagnetic Compatibility.

8-4. TOOLS AND MATERIALS REQUIRED FOR INSTALLATION. No special tools or materials are required for this installation. Refer to table 1-3 for test equipment required for checkout procedures.

8-5. UNPACKING AND REPACKING. The receiver, together with its technical manual, is shipped in a double-walled cardboard container that conforms to MIL-SPEC PP-PB-1364. The receiver is placed inside a 2-mil plastic bag which is sealed and placed on a bed of commercial polyurethane foam, separated by a plastic sheet. A second plastic sheet is placed over the receiver and the container is then completely filled with the polyurethane material. The shipping carton is then sealed shut with plastic, fiber-reinforced, strapping tape. Crated and uncrated dimensions are given in table 1-2. No special tools are required for opening the carton, a knife with a sharp blade will be sufficient.

a. Unpacking and Inspection. To remove the receiver from its shipping container, place the carton in an upright position as noted on the box, cut the tape sealing the lid and open the container. Take out the lid that has been formed by the polyurethane material, remove the technical manual in its separate plastic bag, and then lift the receiver from the shipping carton. Take the receiver out of its plastic bag and inspect it for any possible damage. Visually inspect all exterior surfaces for dents and scratches. If external damage is visible, remove the dust covers and inspect the internal components for apparent damage. Then check the internal cables for loose

connections, and plug-in items such as printed wiring cards, which may have been loosened from their receptacles.

b. Repacking. To repack the receiver, simply reverse the procedures used to unpack, if the original packing material has been retained. If it has not, use locally established procedures for packing of electronic equipment.

8-6. INPUT REQUIREMENTS. Table 8-1 provides a summary list of receiver input requirements.

8-7. INSTALLATION PROCEDURES. No assembly of the receiver is necessary as it is shipped as a complete unit. Figure 8-1 gives the critical dimensions of the unit. Internal selections for the ac line voltage and both the line audio and isb audio output attenuators should be made before mounting the receiver in the rack. The receiver may be operated from either 115 Vac or 230 Vac, ±15%, line voltage. Each of the attenuators may be switched on or off, as required. Refer to table 1-1 and paragraph 8-11d(1) and 8-11d(3), for the line audio and isb audio output characteristics with the attenuators on or off.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

8-8. LINE VOLTAGE SELECTION.

WARNING

To prevent electrical shock, or damage to the receiver, place the POWER PUSH ON/OFF pushbutton in the off (out-red background not displayed) position and disconnect the power cord from A13J1 during line voltage selection.

a. Unplug line cord from connector A13J1.

b. Turn receiver power switch to OFF (out) position.

c. Remove receiver top cover.

d. Locate voltage select switches S3 (54, figure 7-2) and S4 (47) next to transformer T1 toward rear of receiver on the left-hand side.

e. Set S3 to 115 Vac or 230 Vac by inserting a screwdriver tip in switch slot and sliding switch to the desired position.

f. Set S4 to HI position if the measured line voltage is between 115 Vac and 132 Vac or 230 Vac and 263 Vac. Set S3 to LO position if the measured line voltage is between 93 Vac and 115 Vac or 195 Vac and 230 Vac.

Table 8-1. Input Requirements

Parameter	Value
Ac input voltage	115 or 230 Vac (±15%) 48-420 Hz
Rf input impedance	50-ohm, unbalanced, nominal
Operating power	70 W (approximately) nominal
Operating temperature	0° C to 50° C

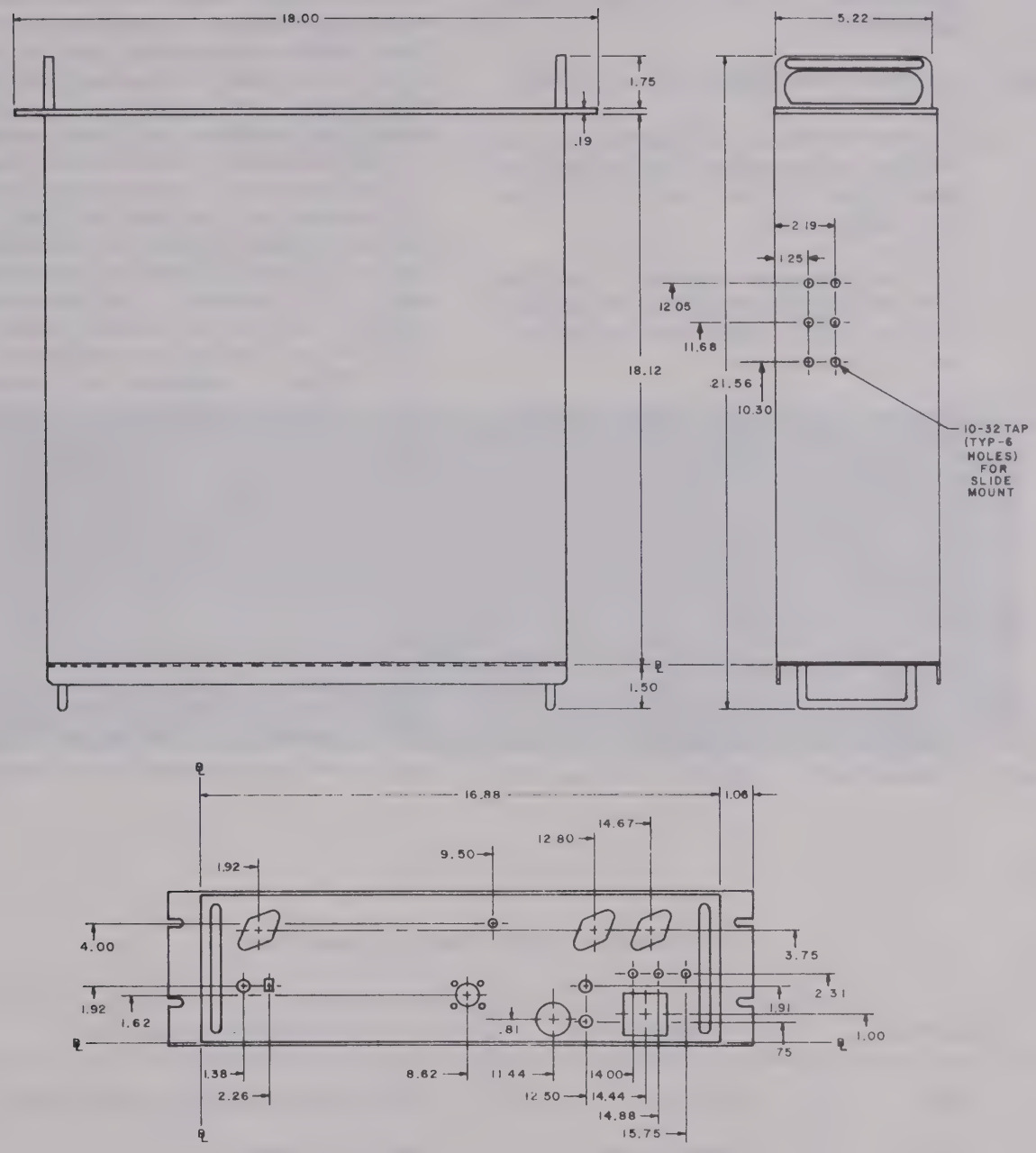

Figure 8-1. AN/URR-74(V)2 Radio Receiving Set, Critical Dimensions

g. Use 1 amp slow-blow fuses for nominal 115 Vac or 1/2 amp slow-blow fuses for nominal 230 Vac in F1 and F2 (see figure 2-2).

8-9. AUDIO ATTENUATORS SELECTIONS.

a. Locate switchable attenuator A11 (for the line audio output) to the right of transformer T2 at rear of receiver (see figure 7-2).

b. Set slide switch to desired position; OFF, when slide switch is in forward position or ON, when slide switch is in rear-most position.

c. Locate switchable audio attenuator A12 (for the isb audio output) to the left of transformer T2.

d. Set slide switch to desired position; ON, when slide switch is in forward position or OFF, when slide switch is in rear-most position.

e. Re-install receiver top cover.

8-10. MOUNTING. The receiver is designed for mounting in a standard 19 inch equipment rack. It occupies 5.25 inches of vertical rack space and extends 19.62 inches into the rack to the tips of the rear protective handles. Do not rely solely on the front panel mounting hardware to support the receiver. Rack slides or supporting brackets should be used. The receiver contains holes on the side panels for mounting to slides. If supporting brackets are used, these should extend along each side from the front panel to the rear panel. All external connections are located at the rear of the receiver. Adequate space should be provided at the rear of the unit to provide connector access and cable clearance. The receiver is not provided with a ventilation system, therefore adequate separation should be provided for air flow. A minimum of 3 inches clearance should be provided at the rear with a minimum of 1 inch at the top and bottom of the receiver. More than 1 inch top and bottom clearance and/or forced air flow around the outside surfaces of the receiver may be required depending upon the amount of heat generated by the adjacent equipment.

8-11 CONNECTORS. Table 8-2 lists the function and type for each of the input and output connectors. Figure 8-2 shows the location of the input and output connectors.

Table 8-2. Input/Output Connections

Connector	Function	Mating Connector Type
A2J1	Rf input	Any compatible type-N male BNC
A13J1	Power input	MS-3102-16S-5S
J11	1 MHz reference	Any compatible male BNC
J12	If. output	Any compatible male BNC
J14	Audio output	JT06A10-13P SR
GND	Grounding	N/A

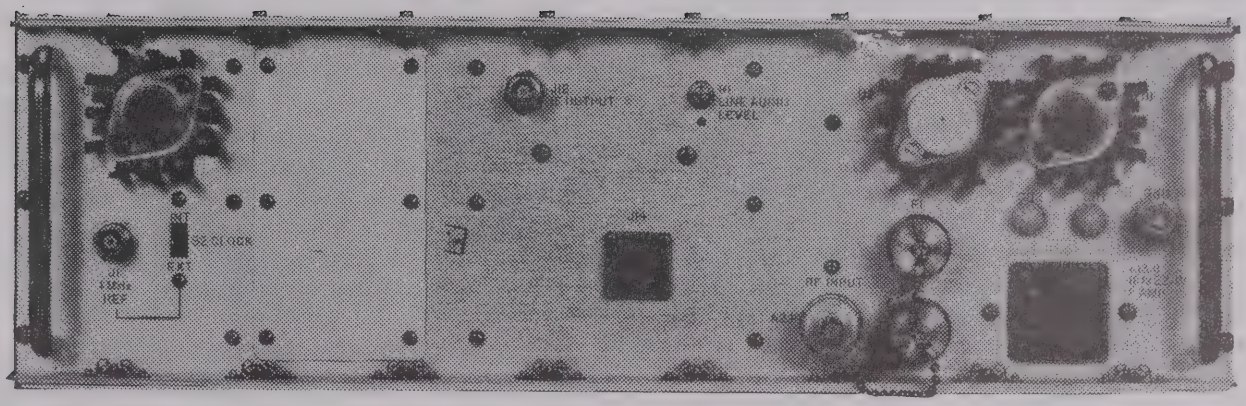

Figure 8-2. Radio Receiving Set, Rear Panel

a. Power Input. 110/220 V, 1 amp power input connector A13J1 is a military standard type MS-3102-16S-5P environmental connector. It is a screw-on type with the following connector pin designation.

Pin A - Hot
Pin B - Ground
Pin C - Hot

Refer to paragraph 8-8 for information regarding input voltage selection.

b. RF Input. RF INPUT-A2J1 is the rf signal input to the receiver. Nominal input impedance is 50 ohms. The input is protected against signals exceeding +15 dBm (1.25 Vrms) and static buildup.

c. Reference Frequency Input/Output. When the S2 CLOCK switch is in INT position the J11-1 MHz-REF connector provides a 1 MHz, 100 millivolts rms output into 50 ohms. When the switch is set to EXT position, a 1 MHz reference signal of at least 50 millivolts rms must be applied to J11 to provide a time base for the receiver.

d. Audio Outputs. Audio output connector J14 is a 13-pin Bendix model connector with an emi backshell. The pin functions are listed in table 8-3. Each audio output is described below.

Table 8-3. Audio Output Connector J14, Pin Functions

Pin	Function
1	Ground
2	Phone audio
3	Line audio
4	Line audio center tap
5	Line audio
6	No connection
7	Isb audio
8	Isb audio center tap
9	Isb audio
10	Ground
11	Fm, cw, ssb audio
12	No connection
13	No connection

(1) The line audio output (terminals 3, 4 and 5) provides a floating, 600-ohm, center tapped audio for the selected detection mode. This output will drive a 600-ohm load from 0 W to at least 1 W (0 V to 24.5 V rms) depending on the setting of the rear panel R1-LINE AUDIO potentiometer.

(2) The phone audio output (terminals 1 and 2) provides a single ended output, which is essentially in parallel with the front panel PHONES output, and is intended to drive a 600-ohm load. Phone audio output level is controlled by the front panel PHONE LEVEL potentiometer and is typically a maximum of 7.8 V rms.

(3) The isb audio output (terminals 7, 8 and 9) provides a center tapped audio during lsb and isb detection mode. No signal is available from these terminals when a detection mode other than lsb or isb is selected. When isb detection mode is selected the usb audio signal is available at the line audio output terminals.

(4) The fm/cw/ssb audio output (terminals 11 and 10) provides a single ended, dc coupled monitoring output of the detection module in fm, cw or ssb detection modes. Use a high impedance voltmeter to measure this output.

e. If. Output. The J12-IF OUTPUT connector provides a 455 kHz if. output signal. Minimum if. output level is 20 millivolt rms into 50 ohms in agc mode, for rf signals greater than 3 microvolts.

f. Grounding Terminal. The GND connector provides additional grounding to that provided by power input connector A13J1.

8-12. REFERENCE FREQUENCY SELECTION. The receiver may be operated with an internally or externally supplied reference frequency. To use the internal reference, set the S2 CLOCK switch on the rear panel (see figure 8-2) to INT. To use the external reference, set this switch to EXT and connect the external 1 MHz reference source to J11. Refer to paragraph 8-11c for external reference requirements.

8-13. INSTALLATION CHECKOUT. This paragraph will provide the procedures necessary to demonstrate that the receiver is operating correctly and within tolerances.

a. Installation Inspection and Pre-Energizing Procedures. Carry out the inspection as listed in table 8-4 prior to application of power or any tests.

b. Initial Turn-On and Preliminary Tests. Carry out the turn-on and operating procedures items as detailed in paragraphs 2-3, 2-4 and tables 2-2 through 2-7.

c. Installation Verification Tests. Successful completion of the scheduled performance tests listed in paragraph 4-4 will verify that the receiver is operating properly.

Record all test results on the installation standards summary sheet which is included as table 8-5.

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